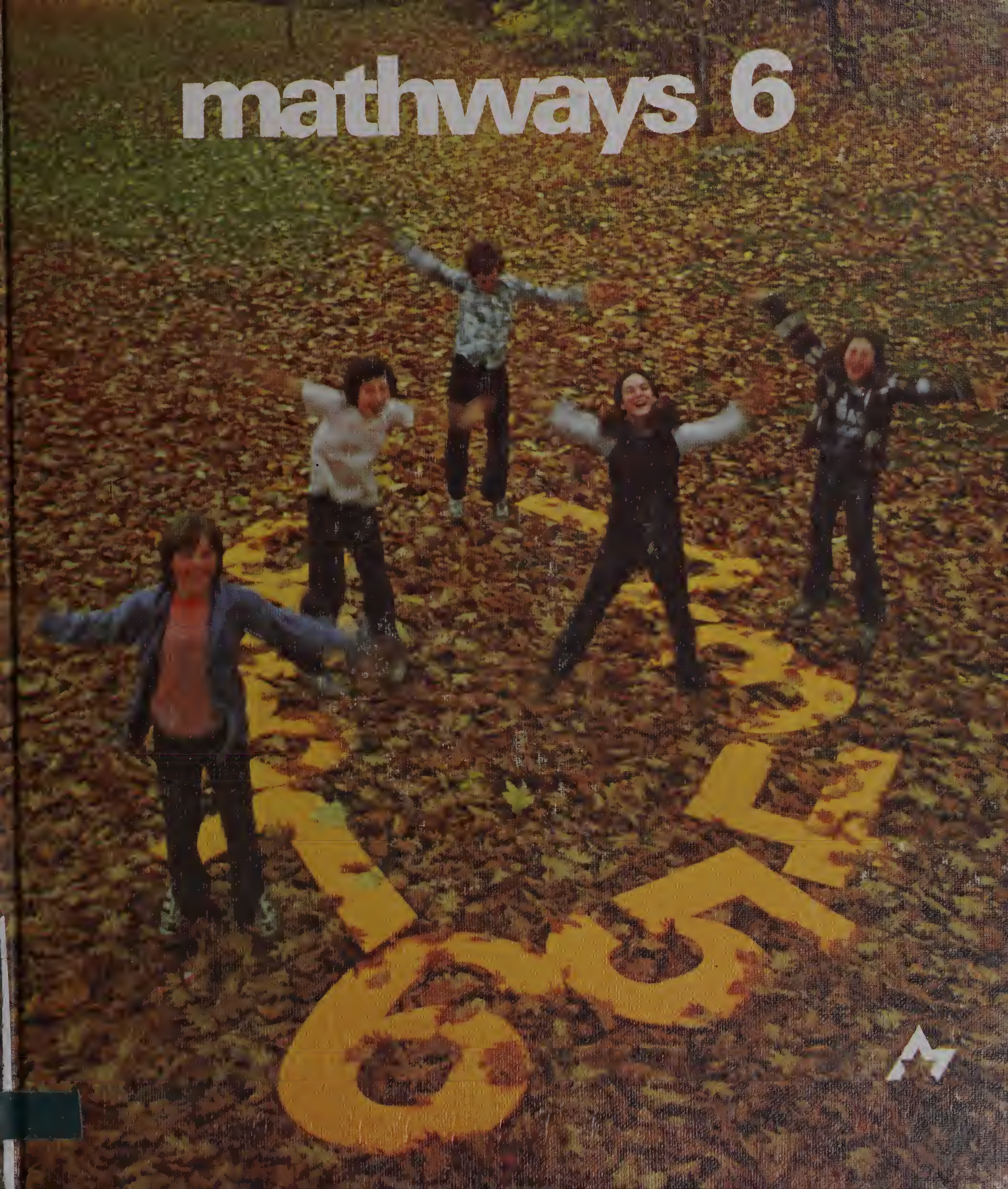


mathways 6



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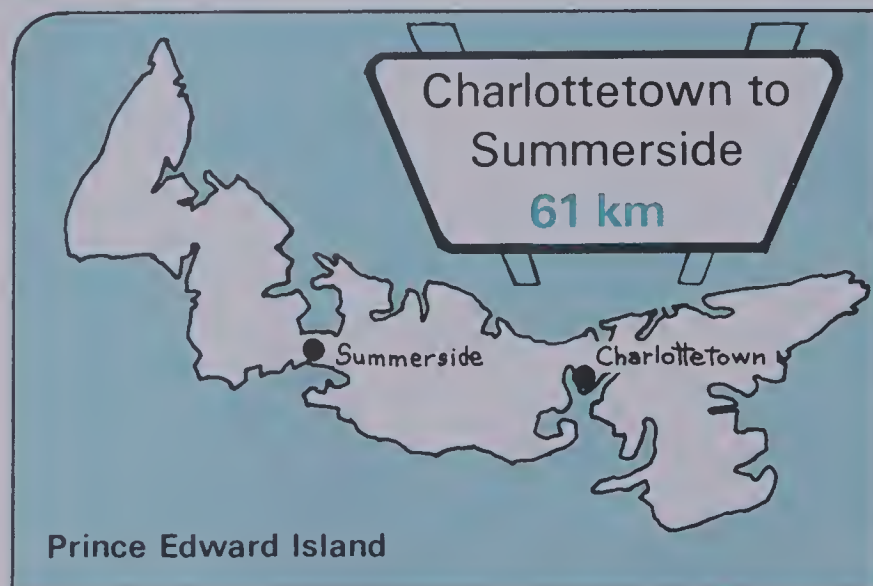
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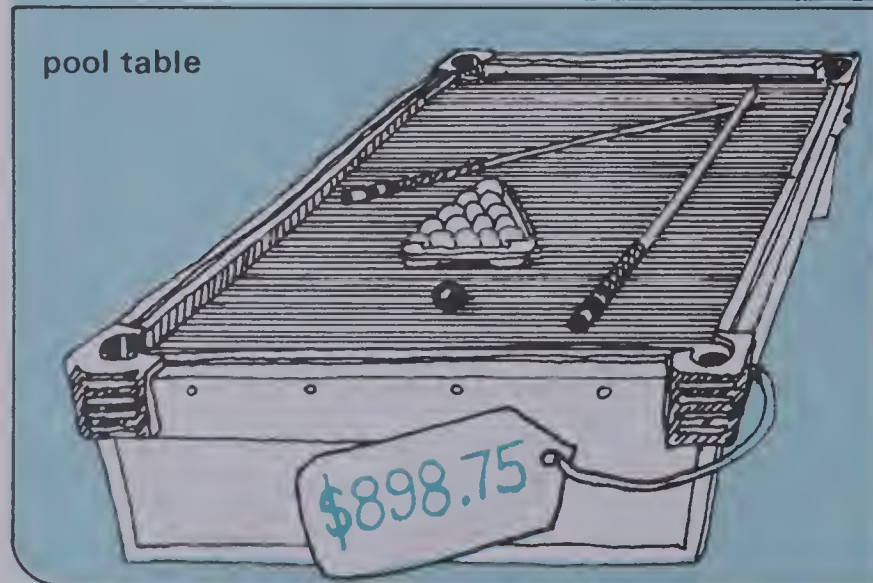
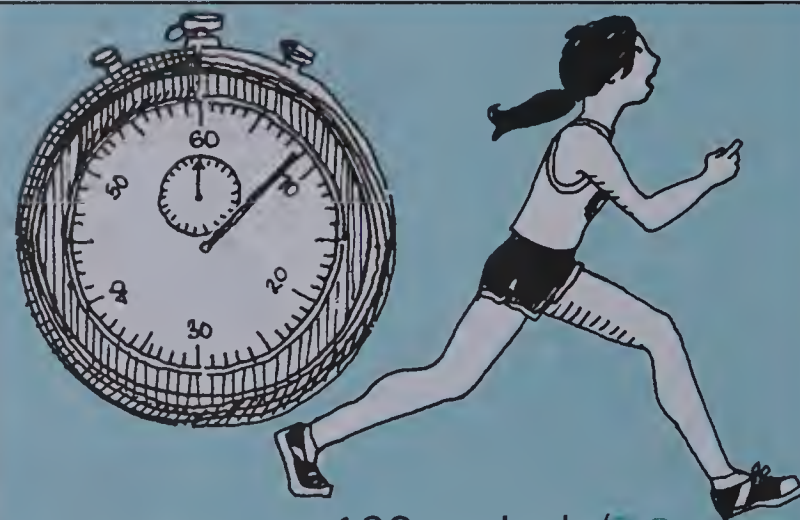
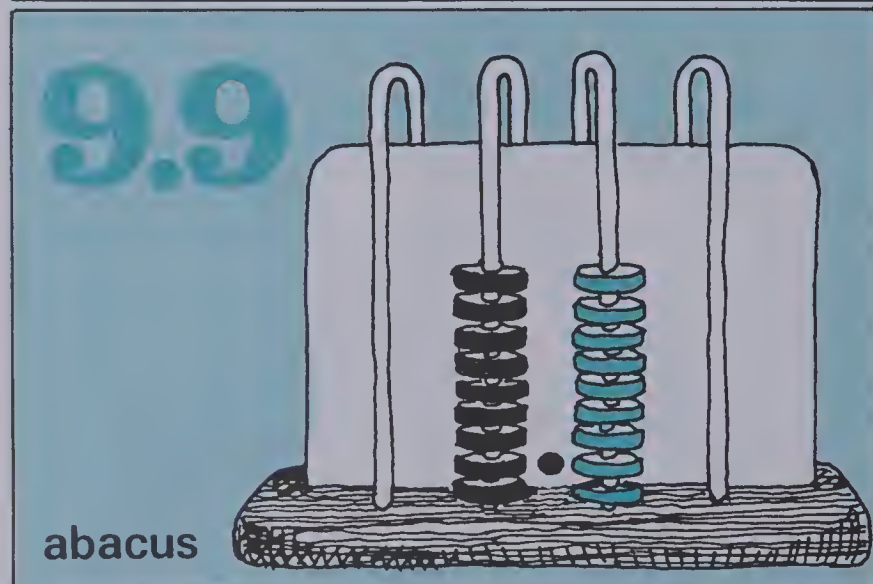
EXPLORE

PLACE VALUE/Millions to Thousandths



61

meaning
6 tens and 1



898.75

expanded form
 $800 + 90 + 8 + 0.7 + 0.05$



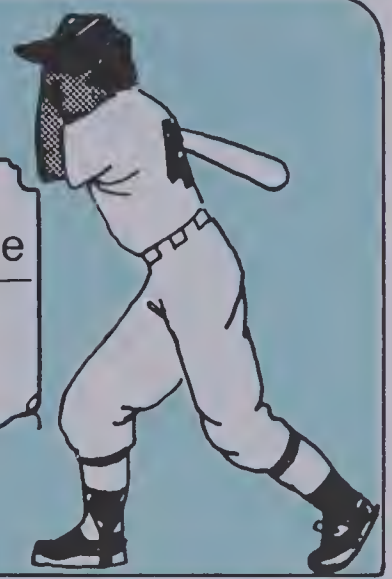
0.355

meaning

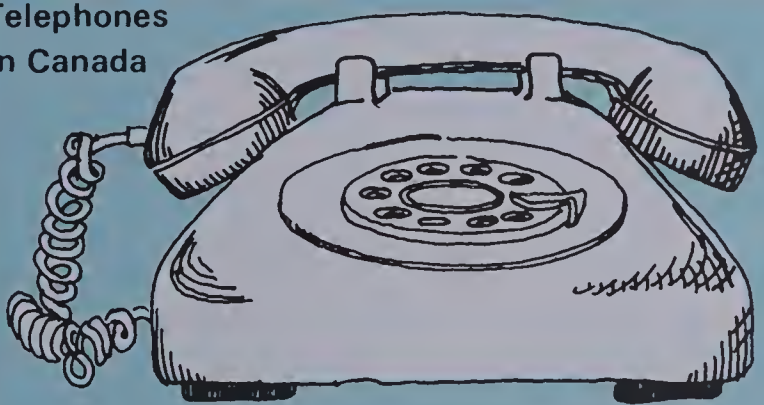
0 ones, 3 tenths, 5 hundredths,
and 5 thousandths

Batting Averages

Player	Average
Aaron, Hank	0.355



Telephones
in Canada



1931	1 475 325
1941	1 684 582
1951	3 126 439

3 126 439

$$\begin{aligned}
 &3\,000\,000 + 100\,000 \\
 &+ 20\,000 + 6\,000 + \\
 &400 + 30 + 9
 \end{aligned}$$

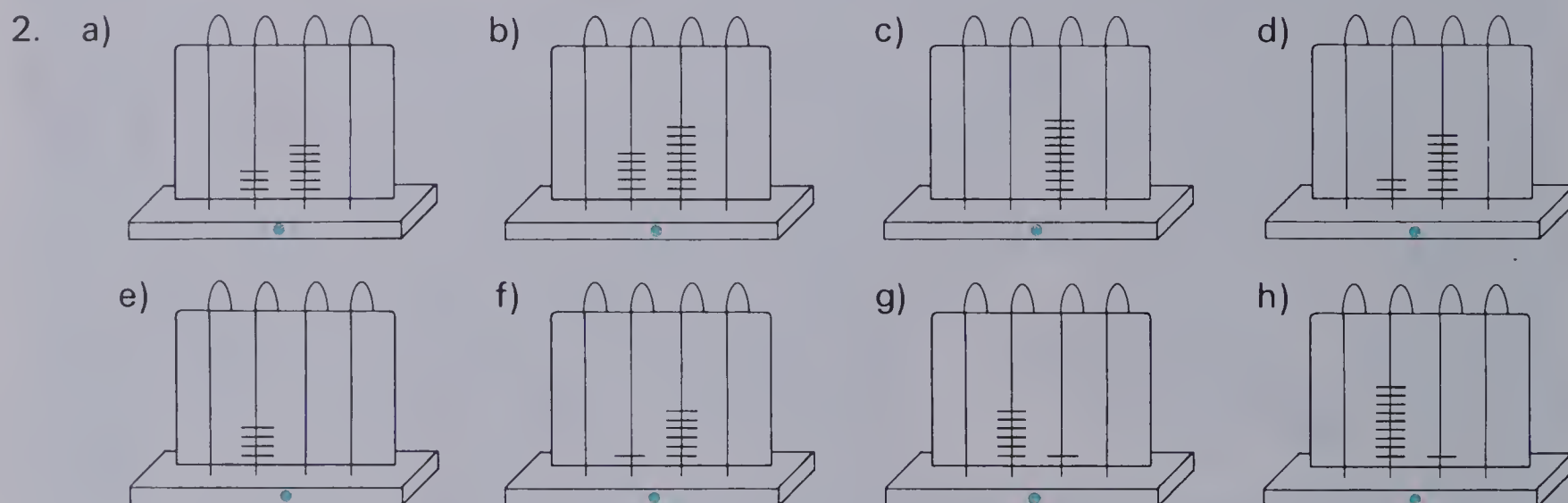
Record the
5 numbers in
a place value
chart like this.

1 000 000	100 000	10 000	1 000	100	10	1	0.1	0.01	0.001
						•			
						•			
						•			
						•			
						•			



1. What is the number?

- | | |
|------------------------------|------------------------------|
| a) 3 tens and 7 | b) 9 tens and 8 |
| c) 1 hundred, 2 tens, and 6 | d) 4 hundreds, 5 tens, and 3 |
| e) 2 hundreds, 7 tens, and 4 | f) 6 hundreds, 8 tens, and 9 |
| g) 8 hundreds, 6 tens, and 5 | h) 9 hundreds, 0 tens, and 1 |



3. a) $100 + 30 + 7 + 0.6 + 0.04$ b) $200 + 40 + 6 + 0.5 + 0.00$
 c) $500 + 90 + 4 + 0.2 + 0.02$ d) $300 + 70 + 1 + 0.3 + 0.05$
 e) $700 + 00 + 2 + 0.1 + 0.06$ f) $900 + 10 + 5 + 0.0 + 0.01$
 g) $400 + 20 + 0 + 0.4 + 0.03$ h) $600 + 50 + 3 + 0.7 + 0.09$

Use the method suggested to explain the number.

4. The Meaning

- | | | | | |
|--------------|------------|---------|----------|------------|
| a) 3.456 | b) 396 452 | c) 7.2 | d) 7.039 | e) 312 |
| f) 1 705 349 | g) 2.125 | h) 4747 | i) 36.88 | j) 5068.98 |

5. Expanded Form

- | | | | | |
|--------------|-----------|------------|--------|--------------|
| a) 2 041 273 | b) 5.301 | c) 530 | d) 8.4 | e) 5 460 801 |
| f) 1.870 | g) 889.87 | h) 987 625 | i) 666 | j) 348.97 |



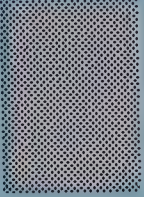
Greatest Sum (3 to 6 players)

A Make a deck of cards like this.

0	1	2	3	4
5	6	7	8	9

B Each player makes a gameboard like this.

C Shuffle the cards and place the deck face down.



The Caller draws the top card and places it face up beside the deck.

D

ALICE	SERGE	LEE																											
<table border="1"><tr><td></td><td>4</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>		4								<table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td>4</td></tr><tr><td></td><td></td><td></td></tr></table>						4				<table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td>4</td></tr></table>									4
	4																												
		4																											
		4																											

In this game, the players wrote the numeral 4 in these places.

E One at a time, 8 more cards were drawn. The players filled in their gameboards and completed the addition. Who had the Greatest Sum?

ALICE	SERGE	LEE																											
<table border="1"><tr><td>6</td><td>4</td><td>3</td></tr><tr><td>5</td><td>9</td><td>0</td></tr><tr><td>2</td><td>8</td><td>1</td></tr></table>	6	4	3	5	9	0	2	8	1	<table border="1"><tr><td>9</td><td>3</td><td>0</td></tr><tr><td>6</td><td>2</td><td>4</td></tr><tr><td>8</td><td>5</td><td>1</td></tr></table>	9	3	0	6	2	4	8	5	1	<table border="1"><tr><td>9</td><td>5</td><td>0</td></tr><tr><td>6</td><td>8</td><td>2</td></tr><tr><td>4</td><td>3</td><td>1</td></tr></table>	9	5	0	6	8	2	4	3	1
6	4	3																											
5	9	0																											
2	8	1																											
9	3	0																											
6	2	4																											
8	5	1																											
9	5	0																											
6	8	2																											
4	3	1																											
?	?	?																											

F Play the game yourself. You may wish to use some of these gameboards.

<table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>										<table border="1"><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>									
\$	.																		
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EXPLORE

EXPONENTS

factor form

$$6 \times 6 \times 6 \times 6 \times 6$$

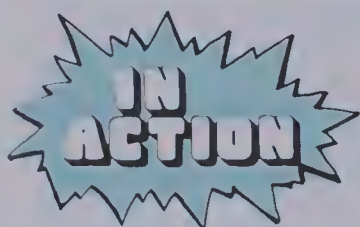
power form

$$6^5$$

← exponent
← base

read as "six to the exponent five"

Factor Form	Factor (Base)	Number of Times Factor Used (Exponent)	Power Form	Standard Numeral
$6 \times 6 \times 6 \times 6 \times 6$	6	5	6^5	7776
$9 \times 9 \times 9$	9	3		
$3 \times 3 \times 3 \times 3 \times 3 \times 3$				
$10 \times 10 \times 10 \times 10$				



1. Write in power form.

a) $4 \times 4 \times 4$

b) $5 \times 5 \times 5 \times 5$

c) $2 \times 2 \times 2 \times 2 \times 2 \times 2$

d) 7×7

e) $3 \times 3 \times 3 \times 3 \times 3$

f) $6 \times 6 \times 6$

g) 10×10

h) $9 \times 9 \times 9 \times 9$

2. Write in factor form.

a) 9^2

b) 6^5

c) 7^3

d) 10^6

e) 8^7

f) 4^4

g) 3^5

h) 2^3

3. Write the standard numeral.

a) 10^3

b) 2^6

c) 9^4

d) 3^5

e) 10^5

f) 6^2

g) 4^5

h) 10^4

4. Complete.

a) $3 \times 3 \times 3 = 3^?$

b) $?^5 = 4 \times 4 \times 4 \times 4 \times 4$

c) $5^4 = ?$

d) $8^? = 8 \times 8$

e) $?^3 = 1000$

f) $7^? = 49$

g) $?^6 = 64$

h) $6 \times 6 \times 6 \times 6 = 6^?$

i) $1^5 = ?$



Power Form/Base 10

Complete the patterns.

$$10^3 = 10 \times 10 \times 10$$

$$= 1000$$

$$10^2 = 10 \times 10$$

$$= ?$$

$$10^1 = ?$$

$$\frac{1}{10^1} = \frac{1}{10}$$

$$= 0.1$$

$$\frac{1}{10^2} = \frac{1}{100}$$

$$= ?$$

$$\frac{1}{10^3} = ?$$

$$= ?$$

$$\frac{7}{10^1} = \frac{7}{10}$$

$$= 0.7$$

$$\frac{7}{10^2} = \frac{?}{100}$$

$$= 0.07$$

$$\frac{7}{10^3} = \frac{?}{?}$$

$$= ?$$



1. Write in power form.

- a) $10 \times 10 \times 10 \times 10$
 d) $10 \times 10 \times 10$
 g) 0.3

- b) 10×10
 e) 0.5
 h) 10

- c) 0.001
 f) $10 \times 10 \times 10 \times 10 \times 10$
 i) 0.009

2. Write the standard numeral.

- a) 10^3 b) $\frac{3}{10^2}$ c) 10^1 d) $\frac{5}{10^1}$ e) 10^2 f) $\frac{2}{10^3}$ g) $\frac{4}{10^2}$

3. Complete.

- a) $10 \times 10 \times 10 \times 10 = 10^?$ b) $\frac{2}{10^2} = ?$ c) $10^? = 10\,000$
 d) $\frac{?}{10^3} = 0.007$ e) $\frac{3}{10^1} = ?$ f) $\frac{5}{10^?} = 0.5$

4. Write in power form.

- a) 0.6 b) 0.04 c) 0.008 d) 0.02 e) 0.4 f) 0.07
 g) 0.004 h) 0.05 i) 0.07 j) 0.01 k) 0.002 l) 0.08

5. What is the number?

- a) $10^2 + 10^1 + \frac{2}{10^1}$ b) $10^3 + 10^2 + \frac{4}{10^2}$ c) $10^2 + 10^1 + \frac{3}{10^3}$
 d) $10^1 + \frac{2}{10^1} + \frac{3}{10^2}$ e) $10^3 + 10^1 + \frac{5}{10^3}$ f) $10^3 + 10^2 + \frac{6}{10^1} + \frac{3}{10^3}$

EXPLORE

ADDITION AND SUBTRACTION/Whole Numbers

ADDITION

$$\begin{array}{r} 674 \\ 925 \\ 847 \\ 523 \\ \hline \end{array}$$

2969

Think Record

10, 15, 19 9
3, 7, 9, 16 6
6, 14, 23, 29 29

SUBTRACTION

$$\begin{array}{r} 47\,382 \\ 16\,564 \\ \hline \end{array}$$

30 818

Think Record

12, 8 8
7, 1 1
13, 8 8
6, 0 0
4, 3 3



1. Add.

a) $\begin{array}{r} 382 \\ 333 \\ 290 \\ 409 \\ 766 \\ \hline \end{array}$

b) $\begin{array}{r} 925 \\ 693 \\ 863 \\ 201 \\ 148 \\ \hline \end{array}$

c) $\begin{array}{r} 387 \\ 616 \\ 620 \\ 485 \\ 500 \\ \hline \end{array}$

d) $\begin{array}{r} 827 \\ 623 \\ 400 \\ 162 \\ 931 \\ \hline \end{array}$

e) $\begin{array}{r} 4\,825 \\ 1\,657 \\ 6\,060 \\ 2\,398 \\ 7\,542 \\ \hline \end{array}$

f) $\begin{array}{r} 7\,567 \\ 3\,754 \\ 6\,097 \\ 2\,846 \\ 1\,008 \\ \hline \end{array}$

2. Subtract.

a) $\begin{array}{r} 84\,396 \\ 45\,169 \\ \hline \end{array}$

b) $\begin{array}{r} 47\,382 \\ 18\,465 \\ \hline \end{array}$

c) $\begin{array}{r} 56\,690 \\ 13\,927 \\ \hline \end{array}$

d) $\begin{array}{r} 92\,500 \\ 61\,984 \\ \hline \end{array}$

e) $\begin{array}{r} 56\,690 \\ 18\,927 \\ \hline \end{array}$

3. Complete the magic squares.

a)

18			21
	15	16	
17	11	12	
6	20		9

b)

6	16		3
	9	8	
7		12	10
18	4	5	15

c)

11		24	14
22		17	19
18			15
	13		26

d)

1	15		4
	6	7	
	10	11	
13			16



Adding and Subtracting with Decimals

ADDITION

$$\begin{array}{r} 36.173 \\ 93.454 \\ + 45.746 \\ \hline \end{array}$$

Think Record

10, 13 3
5, 10, 17 7
8, 12, 13 3
6, 9, 15 5
5, 14, 17 17

SUBTRACTION

$$\begin{array}{r} \$48.36 \\ - 29.37 \\ \hline \end{array}$$

Think Record

16, 9 9
12, 9 9
17, 8 8
3, 1 1



1. Add.

a) $\begin{array}{r} 86.9 \\ 72.6 \\ + 45.8 \\ \hline \end{array}$

b) $\begin{array}{r} 106.7 \\ 48.5 \\ + 67.4 \\ \hline \end{array}$

c) $\begin{array}{r} 27.63 \\ 9.08 \\ + 17.87 \\ \hline \end{array}$

d) $\begin{array}{r} 86.68 \\ 39.75 \\ + 24.82 \\ \hline \end{array}$

e) $\begin{array}{r} 36.526 \\ 4.983 \\ + 16.207 \\ \hline \end{array}$

2. Subtract.

a) $\begin{array}{r} 435.7 \\ - 28.9 \\ \hline \end{array}$

b) $\begin{array}{r} 579.3 \\ - 369.4 \\ \hline \end{array}$

c) $\begin{array}{r} 24.35 \\ - 17.46 \\ \hline \end{array}$

d) $\begin{array}{r} 48.83 \\ - 29.85 \\ \hline \end{array}$

e) $\begin{array}{r} 36.374 \\ - 9.478 \\ \hline \end{array}$

3. Find the total amount.

a) $\begin{array}{r} \$6.25 \\ 9.43 \\ 8.34 \\ + 8.08 \\ \hline \end{array}$

b) $\begin{array}{r} \$17.52 \\ 51.80 \\ 83.17 \\ + 2.61 \\ \hline \end{array}$

c) $\begin{array}{r} \$ 4.76 \\ 95.99 \\ 9.23 \\ + 78.38 \\ \hline \end{array}$

d) $\begin{array}{r} \$20.50 \\ 47.11 \\ 13.79 \\ + 84.28 \\ \hline \end{array}$

e) $\begin{array}{r} \$72.41 \\ 40.37 \\ 36.82 \\ + 58.23 \\ \hline \end{array}$

4. Find the difference in amount.

a) $\begin{array}{r} \$ 7.37 \\ - 5.28 \\ \hline \end{array}$

b) $\begin{array}{r} \$ 4.91 \\ - 1.76 \\ \hline \end{array}$

c) $\begin{array}{r} \$ 23.35 \\ - 9.76 \\ \hline \end{array}$

d) $\begin{array}{r} \$ 18.42 \\ - 9.66 \\ \hline \end{array}$

e) $\begin{array}{r} \$133.20 \\ - 87.42 \\ \hline \end{array}$

f) $\begin{array}{r} \$53.64 \\ - 47.99 \\ \hline \end{array}$

g) $\begin{array}{r} \$84.33 \\ - 29.55 \\ \hline \end{array}$

h) $\begin{array}{r} \$120.50 \\ - 75.84 \\ \hline \end{array}$

i) $\begin{array}{r} \$232.25 \\ - 176.49 \\ \hline \end{array}$

j) $\begin{array}{r} \$109.40 \\ - 79.98 \\ \hline \end{array}$

Catalogue Shopping

SALE

CAMPING GOODS

Kingsize Fun!

This spacious 350 cm by 450 cm tent is easy to assemble. Rubber floor is easy to keep clean. Complete with 175 cm canopy. Sleeps 6.

Reg. \$166.97 Sale **\$139.49**



Northwoods Sleeping Bag
75 cm by 200 cm. Features 1 kg feather and down fill. Nylon shell with cotton lining. Reg. \$39.97

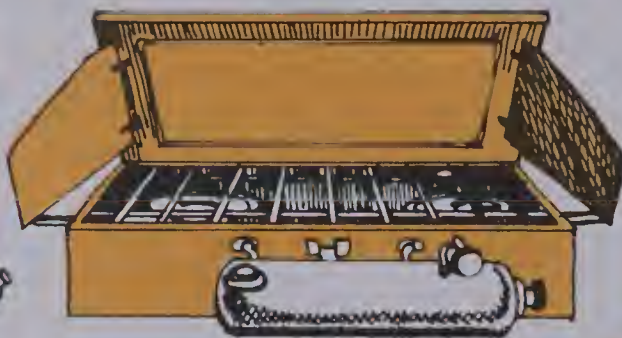
Sale **\$33.33**



Naphtha Gas Stove

Top performance model, 2 burners. Fuel cylinder holds 0.5 l. Cooking area is 30 cm by 40 cm. Folds down for storage.

Reg. \$26.97 Sale **\$22.75**



Naphtha Gas Lantern

Single control, instructions.

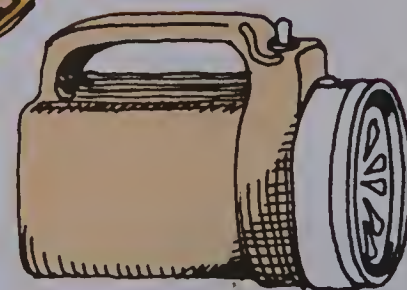
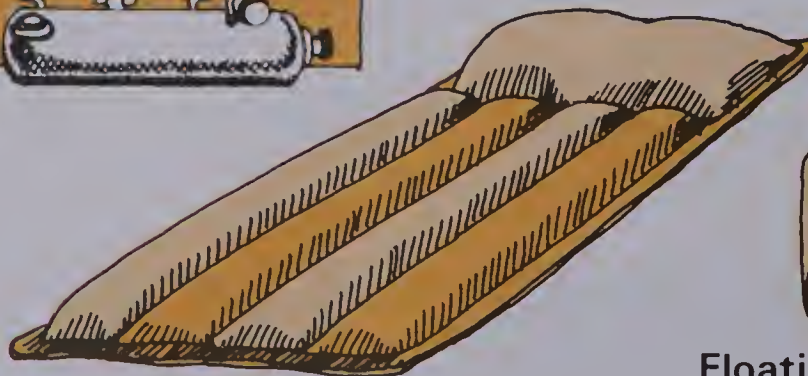
Reg. \$26.87

Sale **\$24.99**

75 cm by 200 cm Air Mattress

Top quality waterproof rubberized cotton. Tube construction.

Reg. \$12.96 Sale **\$10.99**



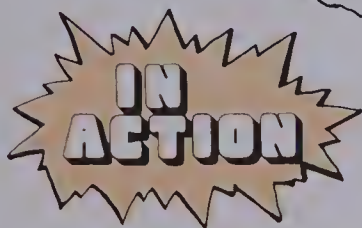
Floating Lantern

Complete with 6 V battery. It's completely watertight.

Reg. \$5.87 Sale **\$4.98**

A Camping Holiday

The Lemieux family from Ottawa decided to go camping next summer. They could save money by purchasing equipment now during the off-season sales. By asking friends and looking in catalogues, they made their plans.



Study the catalogue prices on page 10 and help the Lemieux answer these questions.

1. They planned to spend \$400.00.
 - a) Can they buy all the equipment they need?
 - b) Could they have purchased all the equipment at regular prices?
 - c) How much will the family save by buying at the sale prices?
 - d) They gave the salesclerk four \$100 dollar bills. What is the change?

Shopping List

1 tent
1 lantern
1 stove
1 flashlight
4 sleeping bags
4 air mattresses

2. Michelle, age 11, was worried that Collosus, their St. Bernard, would have to sleep outside because there wouldn't be enough room. Henri, her 13 year old brother, thought there would be.

He did some calculating.

Area of tent $350 \text{ cm} \times 450 \text{ cm} = ? \text{ cm}^2$

Area of 1 sleeping bag $75 \text{ cm} \times 200 \text{ cm} = ? \text{ cm}^2$

Area of 4 sleeping bags $4 \times ? \text{ cm}^2 = ? \text{ cm}^2$

About how much floor space would there be for Colossus?

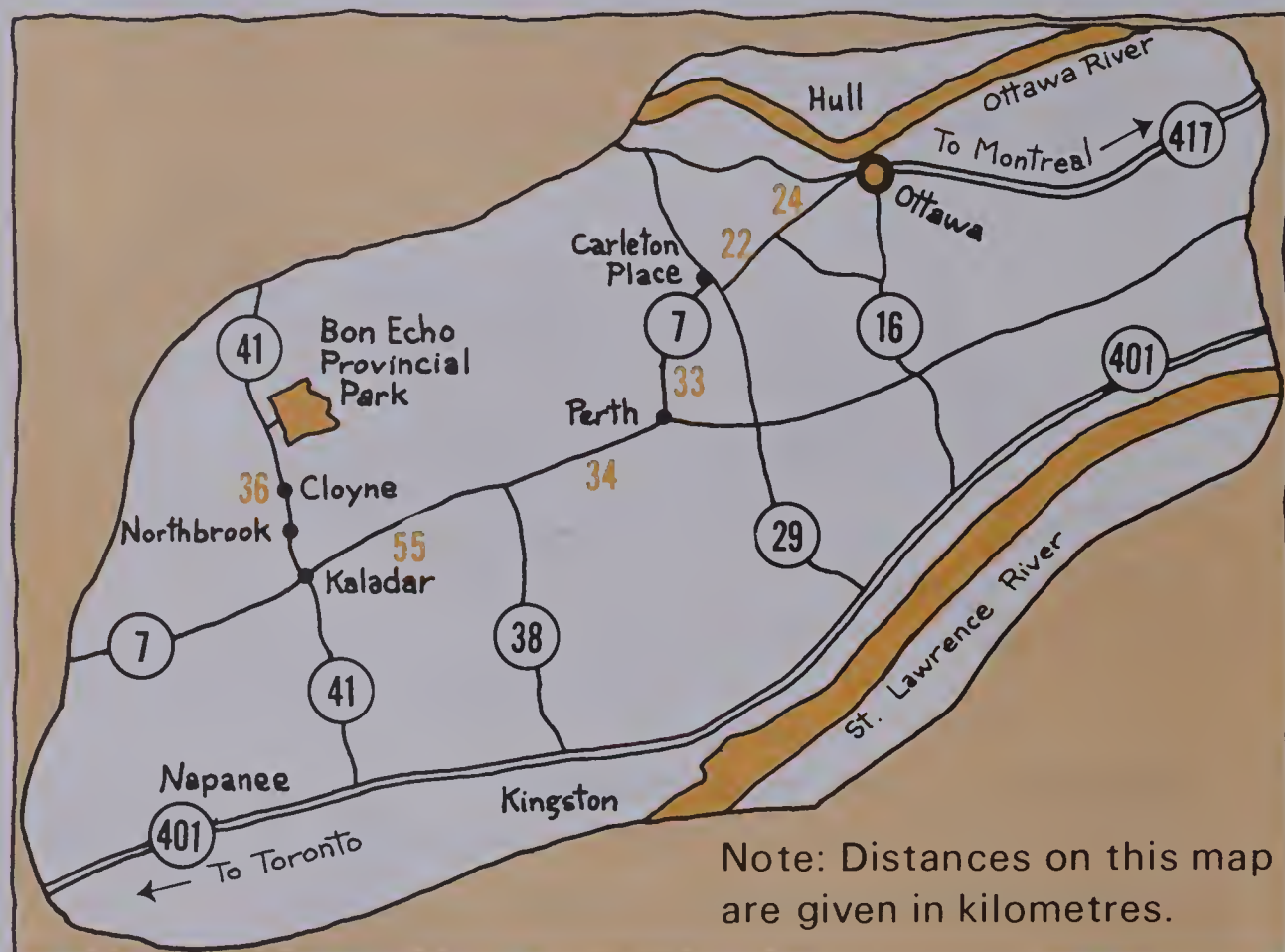


After buying their equipment, the Lemieux family planned their first camping weekend. Their friends had suggested Bon Echo Provincial Park.

3. They studied the map.

From Ottawa to Carleton Place is 46 km ($24 + 22$).

- How far is it from Carleton Place to Kaladar?
- How far is it from Perth to the Park?
- How many kilometres would they have to travel to get from Ottawa to Bon Echo Provincial Park?

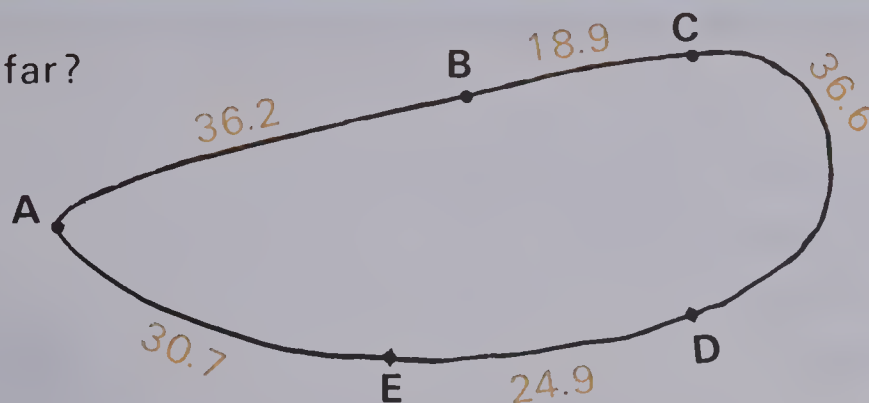


- The tank of the Lemieux car holds 60 l of gas. The car gets 17 l / 100 km. 1 l of gas costs 18¢.
 - How many litres of gas will it take to travel from Ottawa to Bon Echo?
 - How much will this cost?
 - Will the car have enough gas left to get back home? How many litres more will the family need?
 - If the gas tank is empty, how much will it cost to fill it?
- The grocery bill for the trip came to \$35.67. Mrs. Lemieux gave the cashier one \$20 bill, one \$10 bill, and two \$5 bills.
 - How much change should she receive?
 - What is the least number of bills she can receive in her change?
 - What is the least number of coins she can get? What would they be?



6. A side trip. How far?

- A to C
- C to E
- B to E
- D to A
- A back to A



Note: Distances on this map are given in kilometres.

7. Other expenses. How much change?

a)



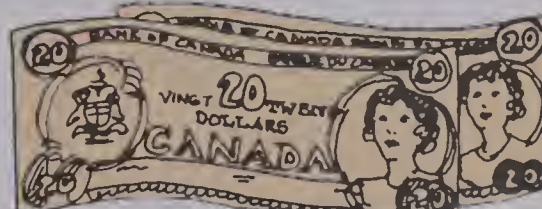
\$4.56
1.97
0.58
2.04
Total ?

b)



\$7.33
4.49
2.17
0.98
3.35
Total ?

c)



\$14.67
0.77
10.93
6.20
Total ?

8. Mr Lemieux compared the costs of camping to those of renting a cottage for 2 weeks the following summer.

- Which would cost the most?
- By how much?
- Which would cost more another summer? Why?

Camping		Cottage	
equipment	\$369.49	rent	\$250.00
food	104.00	food	104.00
gas	12.75	gas	14.75
campsite fees	38.50		

9. Campsite fees are \$2.75/d (\$2.75 per day). The Lemieux family paid for 3 weeks in advance. Because of the rain, they left 4 d early. How much would they get back?

10. Collosus' mass is 83.9 kg. Henri's mass is 46.2 kg. Michelle's mass is 35.6 kg. What is the difference in mass

- between Michelle and Collosus?
- between Henri and Michelle?
- between Collosus and Henri?

EXPLORE

DEVELOPMENT OF PROBLEM SOLVING/Word Problems

Problem

Sylvia read 52 books in 1 a. Ron read 48 books.
How many books did Sylvia and Ron read?

To understand a problem it helps to:

1. think of an easier example
2. illustrate the example.

Think

*If Sylvia read 3 books
and Ron read 2 books,
how many books
did Sylvia and Ron read?*

Sylvia and Ron

Sylvia
111

Ron
11

$$3 + 2 = 5$$

They read 5 books.
Addition is the key.

Solution

Sylvia read 52 books.
Ron read 48 books.
 $52 + 48 = 100$
They read 100 books.



**IN
ACTION**

1. 37 people visited a school on the first day of open house. 53 visited on the second day, and 49 on the third. How many visitors came in the 3 d? Think of an easier example. Illustrate it. Solve the original problem.
2. The school custodian planted a spring flower bed. He used 100 tulip bulbs, 70 daffodil bulbs, and 200 crocus bulbs. How many bulbs did he plant?



IN ACTION

1. 125 boys attended summer hockey school. 64 boys attended for the first time. How many boys returned to the hockey school?
2. A small plane flew 2500 km. It stopped to refuel after 1800 km. How many kilometres were left in the journey?

Problem

Sylvia and Ron read 100 books in 1 a.
Sylvia read 52 books. How many books did Ron read?

Think

If Sylvia and Ron read 5 books
and Sylvia read 3 books,
how many books
did Ron read?

Sylvia and Ron

11111 Sylvia

$$5 - 3 = 2$$

Ron read 2 books.
Subtraction is the key.

Solution

Sylvia and Ron read 100 books.
Sylvia read 52 books.
 $100 - 52 = 48$
Ron read 48 books.



3. Mona Smith, the school secretary, collected \$131.42 for the Red Cross. Room 8 gave an additional \$16.38. What was the total amount collected for the Red Cross?
4. Miriam skated 15 laps around the school's outdoor rink the first day, 20 laps the second day, and 24 laps the third day. How many laps did she skate in the 3 d?
5. Mr. Patterson, school principal, ordered crests for his hockey team. He had \$30 to pay the bill of \$28.74. How much money did he have left?
6. 4 pieces of rope were placed end-to-end to measure the length of a field. They measured 13.8 m, 23.9 m, 21.3 m, and 31.5 m. What was the length of the field?
7. A ball of string measuring 50 m was used in an art class..At the end of the class 13.7 m remained. How many metres of string were used by the class?
8. The school library received 165 new books. There was space for only 130 on the shelves. How many books remained to be shelved?
9. A school achieved 438 gold, silver and bronze Canada Fitness awards. 97 of the awards were gold. How many of the awards were silver and bronze?
10. At the end of a month, the school's bank book showed a balance of \$118.36. The next month there was a withdrawal of \$54.91. What was the balance at the end of that month?

EXPLORE

MULTIPLICATION AND DIVISION/Multiplying by 1, 10, 100



1 is the first counting number.

It is an odd number.

Add 1 to any whole number,

and you get the next greater whole number:

0, $0 + 1 = 1$, $1 + 1 = 2$, $2 + 1 = 3$, $3 + 1 = 4$, and so on.

By continually adding 1,

we can generate all the whole numbers.

Any number times 1 is the number itself.

$0 \times 1 = 0$, $1 \times 1 = 1$, $2 \times 1 = 2$, $3 \times 1 = 3$ and so on.

Does this same property hold for decimals?

$0.5 \times 1 = 0.5$, $4.5 \times 1 = 4.5$, $25.3 \times 1 = 25.3$

Think about the patterns:

$$25 \times 10 = 250$$

$$4 \times 10 = 40$$

$$25 \times 100 = 2500$$

$$4 \times 100 = 400$$

$$2.5 \times 10 = 25$$

$$0.4 \times 10 = 4$$

$$2.5 \times 100 = 250$$

$$0.4 \times 100 = 40$$

$$0.25 \times 10 = 2.5$$

$$0.04 \times 10 = 0.4$$

$$0.25 \times 100 = 25$$

$$0.04 \times 100 = 4$$

We use a decimal number system.

While the digits may be the same for many numbers,

the position of the decimal point

determines the magnitude of the number:

Compare 1360, 136, 13.6, 1.36, 0.136

What is your rule for moving the decimal point when you

a) multiply by 10?

b) multiply by 100?



Complete.

1. a) $6 \times 10 = ?$

2. a) $7 \times 100 = ?$

3. a) $18 \times 10 = ?$

4. a) $0.8 \times 10 = ?$

b) $0.5 \times 10 = ?$

b) $0.4 \times 100 = ?$

b) $1.5 \times 10 = ?$

b) $0.01 \times 10 = ?$

c) $4.7 \times 10 = ?$

c) $5.8 \times 100 = ?$

c) $23 \times 100 = ?$

c) $0.8 \times 100 = ?$

d) $13.8 \times 10 = ?$

d) $17.9 \times 100 = ?$

d) $1.9 \times 100 = ?$

d) $0.01 \times 100 = ?$

e) $47.02 \times 10 = ?$

e) $53.16 \times 100 = ?$

e) $2.43 \times 100 = ?$

e) $1.08 \times 100 = ?$



Dividing by 1, 10, 100

Any number divided by 1 is the number itself.

$0 \div 1 = 0$, $2 \div 1 = 2$, $5.7 \div 1 = 5.7$, $12.9 \div 1 = 12.9$, and so on.

Since

then

$$25 \times 10 = 250,$$

$$250 \div 10 = 25$$

$$5 \times 10 = 50,$$

$$50 \div 10 = 5$$

$$2.5 \times 10 = 25,$$

$$25 \div 10 = 2.5$$

$$0.5 \times 10 = 5,$$

$$5 \div 10 = 0.5$$

$$0.05 \times 10 = 0.5,$$

$$0.5 \div 10 = 0.05$$

Since

then

$$37 \times 100 = 3700,$$

$$3700 \div 100 = 37$$

$$7 \times 100 = 700,$$

$$700 \div 100 = 7$$

$$3.7 \times 100 = 370,$$

$$370 \div 100 = 3.7$$

$$3.75 \times 100 = 375,$$

$$375 \div 100 = 3.75$$

$$0.75 \times 100 = 75,$$

$$75 \div 100 = 0.75$$

What is your rule for moving the decimal point when you

a) divide by 10? b) divide by 100?



1. Complete.

a) $490 \div 10 = ?$

b) $2900 \div 100 = ?$

c) $17 \div 1 = ?$

d) $10 \div 1 = ?$

$90 \div 10 = ?$

$900 \div 100 = ?$

$17 \div 10 = ?$

$10 \div 10 = ?$

$95 \div 10 = ?$

$90 \div 100 = ?$

$17 \div 100 = ?$

$10 \div 100 = ?$

$9 \div 10 = ?$

$9 \div 100 = ?$

$1.7 \div 10 = ?$

$1 \div 10 = ?$

$0.9 \div 10 = ?$

$1 \div 100 = ?$

$1.7 \div 100 = ?$

$1 \div 100 = ?$

2. Divide by 10.

a) 113

b) 13

c) 1.3

d) 0.13

e) 1.5

f) 0.15

g) 0.05

h) 0.01

3. Divide by 100.

a) 225

b) 25

c) 2

d) 7

e) 0.2

f) 0.1

g) 5

h) 0.5

4. 100 guards were stationed along the west side of a parade route. If the route was 8 km long, how many metres of the route did each guard?

5. There were 101 floats in the parade. It took 2.5 h for the floats to pass through the entrance of the exhibition grounds. About how often did a float pass through the entrance? Think: 2 floats, 1 interval of time, 3 floats, 2 intervals of time.



Multiplying and Dividing by 1000

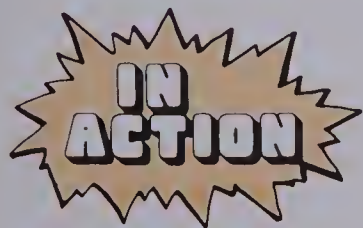
Consider the patterns:

$2 \times 10 = 20$	$20 \div 10 = 2$	$3.5 \times 10 = 35$	$35 \div 10 = 3.5$
$2 \times 100 = 200$	$200 \div 100 = 2$	$3.5 \times 100 = 350$	$350 \div 100 = 3.5$
$2 \times 1000 = 2000$	$2000 \div 1000 = 2$	$3.5 \times 1000 = 3500$	$3500 \div 1000 = 3.5$

$0.35 \times 10 = 3.5$	$3.5 \div 10 = ?$	$2 \times 1000 = 2000$	$2000 \div 1000 = 2$
$0.35 \times 100 = ?$	$35 \div 100 = 0.35$	$0.2 \times 1000 = 200$	$200 \div 1000 = ?$
$0.35 \times 1000 = 350$	$350 \div 1000 = 0.35$	$0.02 \times 1000 = 20$	$20 \div 1000 = 0.02$

What is your rule for moving the decimal point when

- a) multiplying by 1000? b) dividing by 1000?



1. Complete the patterns.

a) $8 \times 10 = ?$	$? \div 10 = 8$	b) $8.5 \times 10 = ?$	$? \div 10 = 8.5$
$8 \times 100 = ?$	$? \div 100 = 8$	$8.5 \times 100 = ?$	$? \div 100 = 8.5$
$8 \times 1000 = ?$	$? \div 1000 = 8$	$8.5 \times 1000 = ?$	$? \div 1000 = 8.5$
c) $0.85 \times 10 = ?$	$? \div 10 = 0.85$	d) $5 \times 1000 = ?$	$? \div 1000 = 5$
$0.85 \times 100 = ?$	$? \div 100 = 0.85$	$0.5 \times 1000 = ?$	$? \div 1000 = 0.5$
$0.85 \times 1000 = ?$	$? \div 1000 = 0.85$	$0.05 \times 1000 = ?$	$? \div 1000 = 0.05$

2. Multiply by 1000.

- a) 6 b) 16 c) 56 d) 0.6 e) 1.6 f) 0.06 g) 1.06 h) 19.16

3. Divide by 1000.

- a) 15 000 b) 5000 c) 500 d) 50 e) 5 f) 5.4 g) 5.45 h) 15.45
i) 75 000 j) 387 k) 965 l) 8.3 m) 16.2 n) 27.23 o) 1.11 p) 1.01

4. If a copier will make 1000 copies in 1 h,
how long will it take to make 4500 copies?



Multiplying and Dividing Multiples of 10

Since $4 \times 3 = 12$,

$$4 \times 30 = 4 \times 3 \times 10$$

$$= 12 \times 10$$

$$= 120$$

$$40 \times 30 = 4 \times 10 \times 3 \times 10$$

$$= 4 \times 3 \times 10 \times 10$$

$$= 12 \times 100$$

$$= 1200$$

then $12 \div 3 = 4$

$$120 \div 30 = 4$$

$$1200 \div 30 = 40$$

When multiplying or dividing multiples of 10
you can write the answer directly if you know the basic facts:

$$7 \times 8 = 56$$

$$56 \div 8 = 7$$

$$70 \times 80 = 5600$$

$$5600 \div 80 = ?$$

We can use multiples of 10 to estimate products.

$$41 \times 39 \text{ is about } 40 \times 40$$

or ?

$$89 \times 74 \text{ is about } ? \times 70$$

or ?

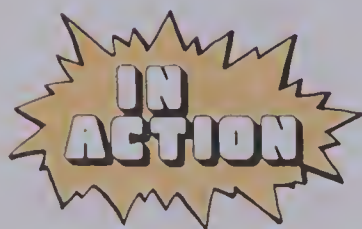
We can use multiples of 10 to estimate quotients.

$$2986 \div 51 \text{ is about } 3000 \div 50$$

or ?

$$4195 \div 69 \text{ is about } 4200 \div 70$$

or ?



Write the answers directly.

1. a) 40×20 b) 30×60 c) 70×90 d) 60×50 e) 40×80 f) 80×90

2. a) $4200 \div 60$ b) $6300 \div 70$ c) $7200 \div 90$ d) $4500 \div 50$ e) $8100 \div 90$

3. Use multiples of 10 to estimate the products.

a) 62×79 is about $? \times ?$

or ?

b) 28×91 is about $? \times ?$

or ?

4. Use multiples of 10 to estimate the quotients.

a) $6288 \div 91$ is about $? \div ?$

or ?

b) $7215 \div 83$ is about $? \div ?$

or ?

EXPLORE

MEASUREMENT/The Metre m

milli (one thousandth)

centi (one hundredth)

deci (one tenth)

millimetre (mm) 0.001 m

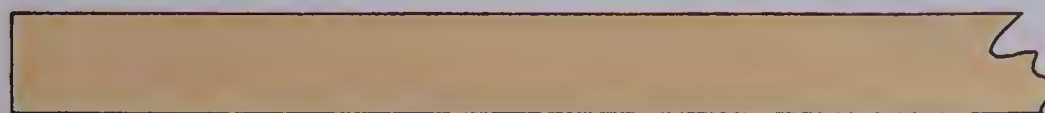
centimetre (cm) 0.01 m

decimetre (dm) 0.1 m

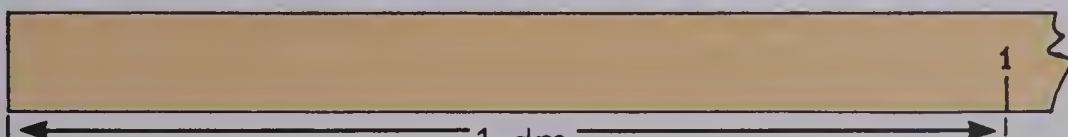
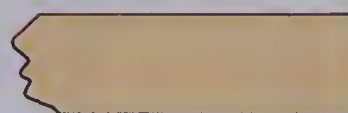
metre

kilo (one thousand)

kilometre 1000 m

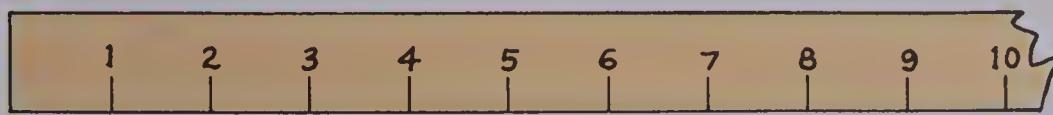
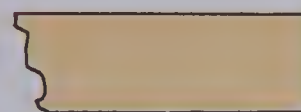


1 m



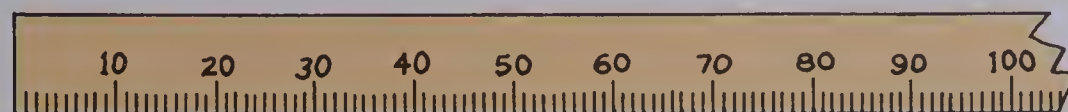
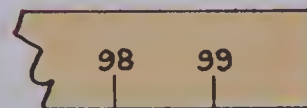
1 dm

1 m = 10 dm



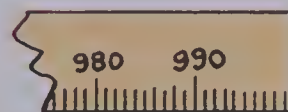
1 cm

1 m = 100 cm



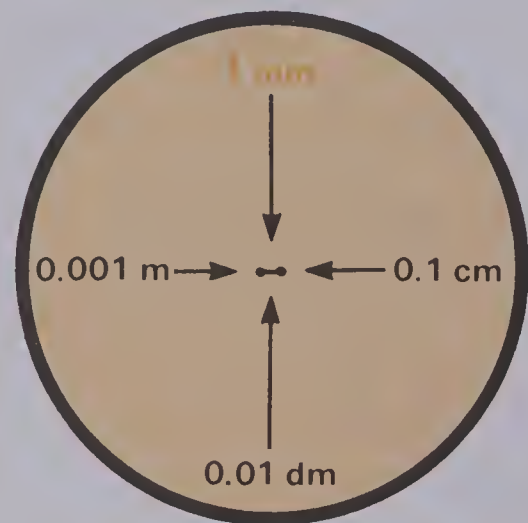
1 mm

1 m = 1000 mm

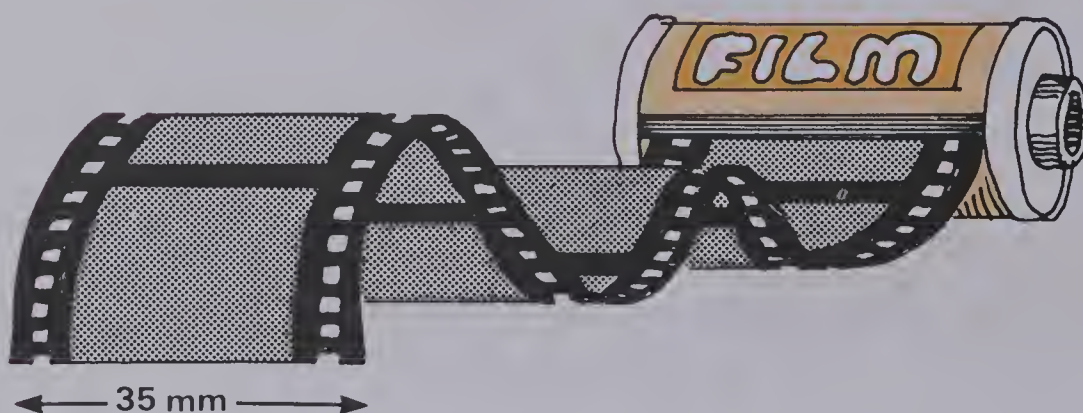




The Millimetre mm



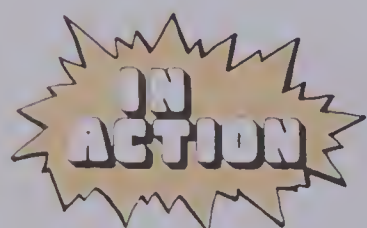
We use the millimetre to measure lengths of nails and bolts, widths of camera film, thickness of plywood, dimensions of stamps, and so on.



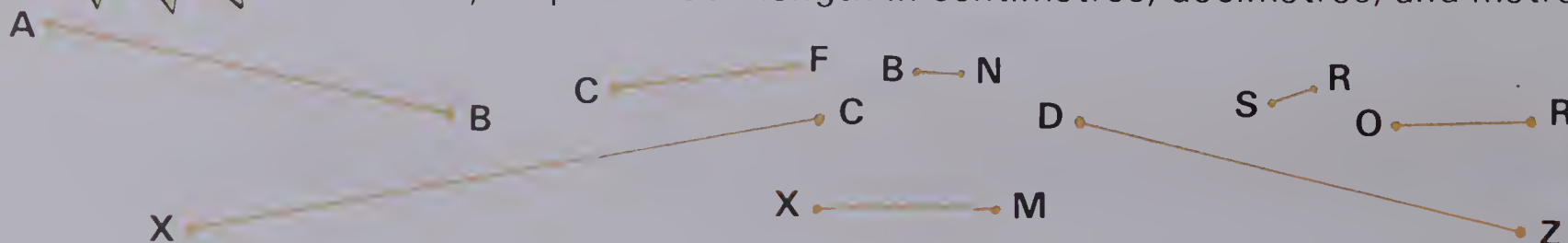
M ————— X

How long is line segment MX?

- 96 mm
- 9.6 cm ($96 \div 10$)
- 0.96 dm ($96 \div 100$)
- 0.096 m ($96 \div 1000$)



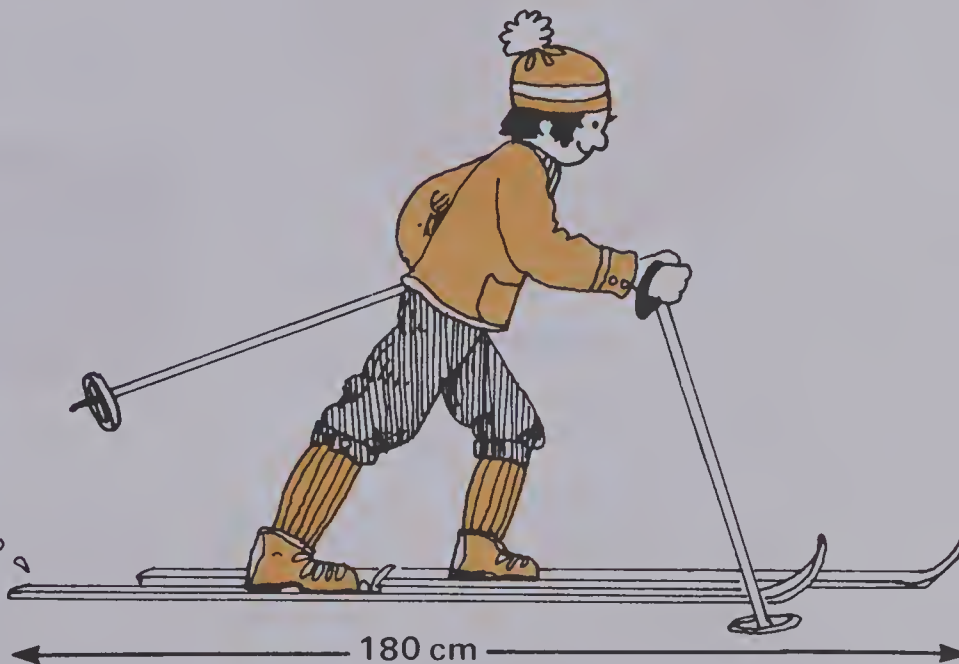
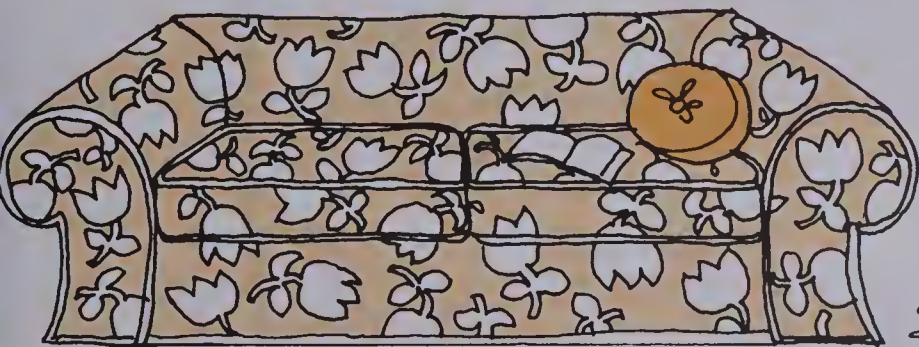
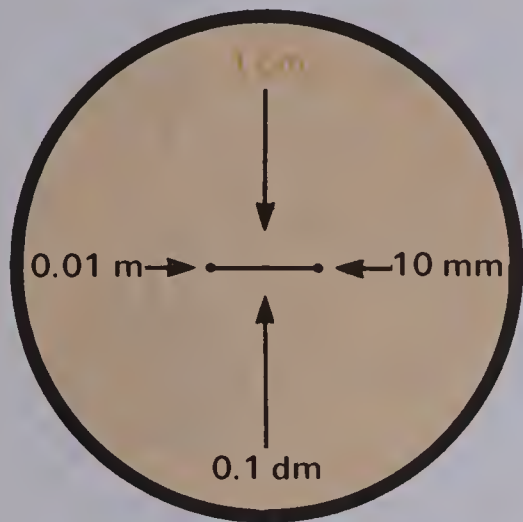
1. a) Measure each line segment in millimetres.
b) Express each length in centimetres, decimetres, and metres.





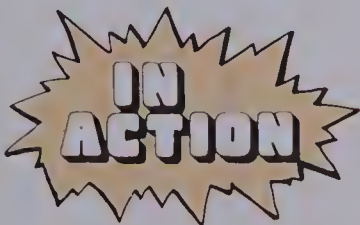
The Centimetre cm

We use the centimetre to measure our height, the length of skis, the width of pieces of furniture, the length of towels, and so on.

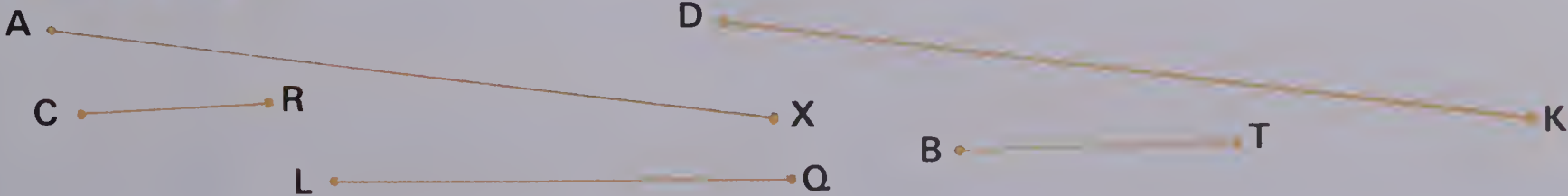


How long is line segment AB?

- 13 cm
- 130 mm (13×10)
- 1.3 dm ($13 \div 10$)
- 0.13 m ($13 \div 100$)



1. a) Measure each line segment in centimetres.
d) Express each length in millimetres, decimetres, and metres.



The Kilometre km



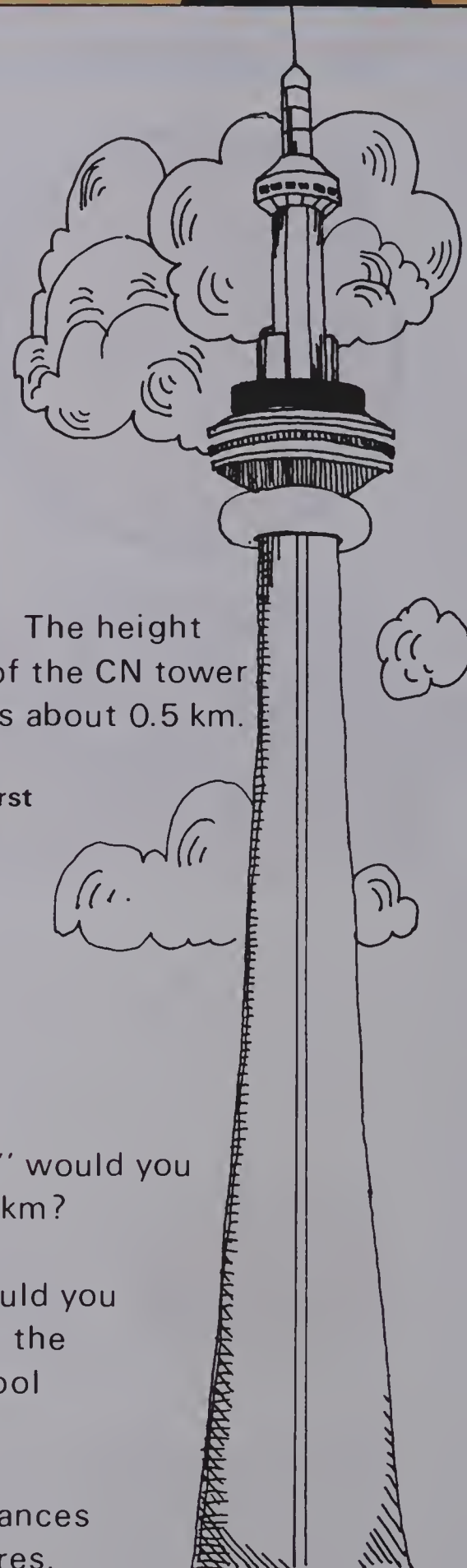
The distance around the earth at the equator is approximately 40 000 km.

We use the kilometre to measure highway distances, lengths of rivers, dimensions of our earth, distances between airports, and so on.

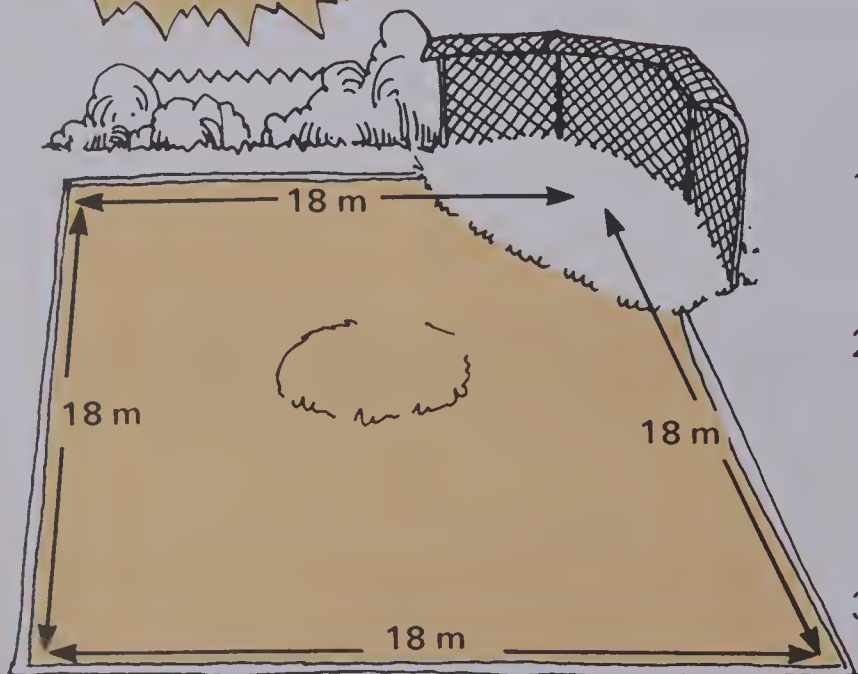
$$1 \text{ km} = 1000 \text{ m}$$



The height of the CN tower is about 0.5 km.



West Brook ● 40 km ● Amherst



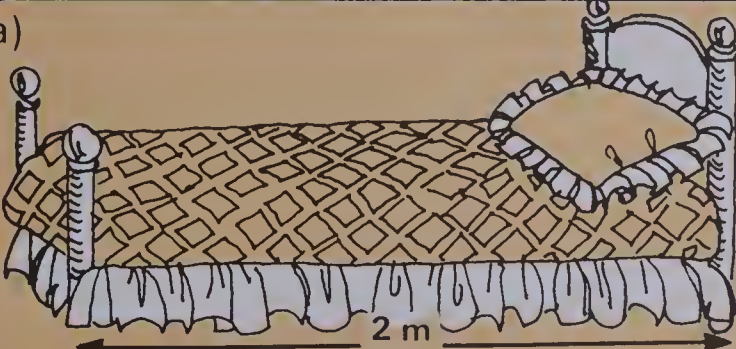
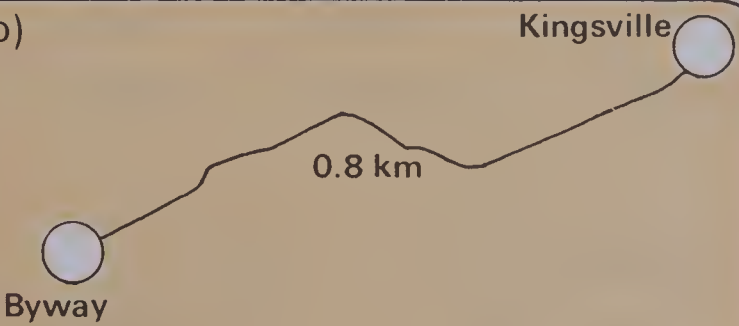
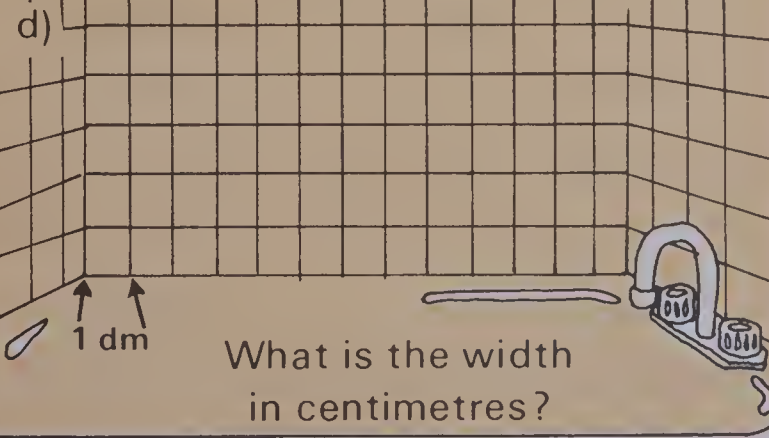
1. How many "homers" would you have to hit to run 1 km?
2. How many times would you have to walk around the outside of your school to walk 1 km?
3. Record 3 other distances you know in kilometres.



4. Which unit (millimetre, centimetre, metre, kilometre) would you use to measure each of these?

- a) the diameter of a button
- b) your hand span
- c) the distance to the moon
- d) the length of your home
- e) your height
- f) the length of a paper clip
- g) the length of the Mackenzie River
- h) the distance from Truro to Halifax
- i) the distance between first base and second base
- j) the distance around a track
- k) the width of a stamp
- l) the length of a baseball bat
- m) the length of a swimming pool
- n) the length of your belt

5.

a)  2 m What is the length in centimetres?	b)  0.8 km Byway Kingsville What is the distance in metres?
c)  16 mm What is the diameter in centimetres?	d)  1 dm What is the width in centimetres?



6. Complete.

- | | | |
|------------------------------------|-----------------------------------|-----------------------------------|
| a) $16 \text{ mm} = ? \text{ cm}$ | b) $183 \text{ m} = ? \text{ km}$ | c) $56 \text{ cm} = ? \text{ m}$ |
| d) $8 \text{ km} = ? \text{ m}$ | e) $2 \text{ dm} = ? \text{ cm}$ | f) $13 \text{ cm} = ? \text{ mm}$ |
| g) $2000 \text{ m} = ? \text{ km}$ | h) $13 \text{ cm} = ? \text{ dm}$ | i) $5 \text{ cm} = ? \text{ dm}$ |
| j) $30 \text{ cm} = ? \text{ mm}$ | k) $750 \text{ m} = ? \text{ km}$ | l) $53 \text{ km} = ? \text{ m}$ |
| m) $8 \text{ m} = ? \text{ cm}$ | n) $50 \text{ mm} = ? \text{ cm}$ | o) $58 \text{ dm} = ? \text{ cm}$ |
| p) $138 \text{ cm} = ? \text{ m}$ | q) $8 \text{ mm} = ? \text{ cm}$ | r) $100 \text{ m} = ? \text{ cm}$ |

7. Complete.

- | | | | |
|---------------------|------------------|----------------|---------------|
| a) 900 mm | $? \text{ cm}$ | $? \text{ dm}$ | $? \text{ m}$ |
| b) $? \text{ mm}$ | 5.6 cm | $? \text{ dm}$ | $? \text{ m}$ |
| c) $? \text{ mm}$ | $? \text{ cm}$ | $? \text{ dm}$ | 8 m |
| d) $? \text{ mm}$ | 6 cm | $? \text{ dm}$ | $? \text{ m}$ |
| e) 5 mm | $? \text{ cm}$ | $? \text{ dm}$ | $? \text{ m}$ |

8. Complete.

- | | | |
|------------------------------------|-------------------------------------|-----------------------------------|
| a) $7 \text{ m} = ? \text{ cm}$ | b) $1000 \text{ m} = ? \text{ km}$ | c) $400 \text{ mm} = ? \text{ m}$ |
| d) $20 \text{ m} = ? \text{ mm}$ | e) $2 \text{ km} = ? \text{ m}$ | f) $50 \text{ mm} = ? \text{ dm}$ |
| g) $70 \text{ mm} = ? \text{ cm}$ | h) $1000 \text{ mm} = ? \text{ dm}$ | i) $5 \text{ m} = ? \text{ mm}$ |
| j) $1000 \text{ mm} = ? \text{ m}$ | k) $170 \text{ m} = ? \text{ km}$ | l) $70 \text{ cm} = ? \text{ mm}$ |
| m) $180 \text{ mm} = ? \text{ m}$ | n) $20 \text{ m} = ? \text{ cm}$ | o) $10 \text{ dm} = ? \text{ m}$ |
| p) $15 \text{ cm} = ? \text{ m}$ | q) $2 \text{ dm} = ? \text{ mm}$ | r) $900 \text{ m} = ? \text{ km}$ |
| s) $19 \text{ dm} = ? \text{ mm}$ | t) $300 \text{ mm} = ? \text{ dm}$ | u) $2 \text{ cm} = ? \text{ m}$ |
| v) $100 \text{ cm} = ? \text{ m}$ | w) $10 \text{ dm} = ? \text{ mm}$ | x) $90 \text{ cm} = ? \text{ m}$ |

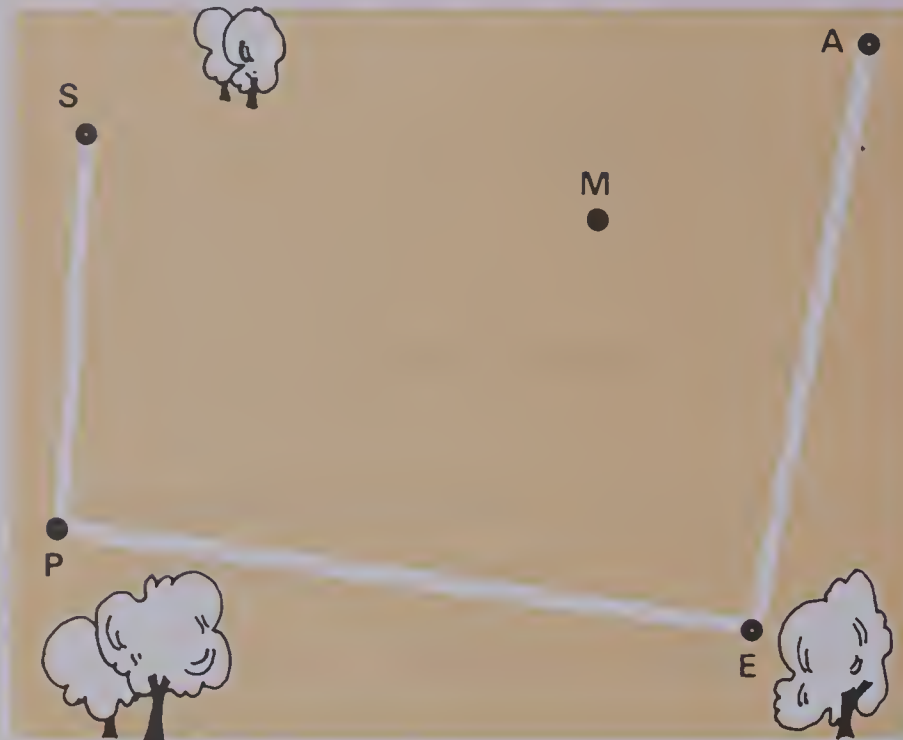


Retrace Your Steps

- Sketch an abacus to show each number.
 - 2 hundreds, 4 tens, 2 ones, and 5 tenths
 - 4 tenths and 2 hundredths
 - 4 thousands, 0 hundreds, 2 ones, 5 tenths, and 7 hundredths
 - 8 ten thousands, 0 thousands, 5 hundreds, 6 tens, 2 ones, 0 tenths, 3 hundredths, and 2 thousandths
- Write the meaning form.
 - 24.6
 - 168.34
 - 5.806
 - 1460.8
 - 3 643 107.7
- Write in power form.
 - 5×5
 - $9 \times 9 \times 9$
 - $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 - $4 \times 4 \times 4 \times 4 \times 4$
- Write the standard numeral.
 - 8^3
 - 1^{10}
 - 2^5
 - 10^4
 - 3^4
 - 7^2
 - 5^6
- Express in centimetres.
 - 23 m
 - 12 m
 - 40 mm
 - 8 dm
 - 6 mm
 - 75 mm
 - 2.5 m
 - 15 dm
 - 2.5 mm
 - 2.25 m
 - 10.5 mm
 - 0.04 dm
- Express in metres.
 - 500 cm
 - 1200 mm
 - 200 dm
 - 150 cm
 - 500 mm
 - 50 mm
 - 9 cm
 - 7.5 cm
 - 4.2 dm
 - 75 mm
- Express in millimetres.
 - 4 m
 - 0.4 m
 - 1 dm
 - 11 cm
 - 3 cm
 - 3.2 dm
 - 5.3 cm
 - 14 m
 - 4.25 cm
 - 1.7 m
- Express in dollars.
 - 30 dimes
 - 50 dimes
 - 300 cents
 - 1000 cents
 - 500 cents
 - 25 dimes
 - 50 cents
 - 4 dimes
 - 5 cents
 - 1 dime
- Express in cents.
 - 10 dimes
 - \$15.00
 - \$35.00
 - 100 dimes
 - 1 dime
 - \$4.00
 - 8 dimes
 - \$2.50
 - 10 dimes
 - \$2.25

Retrace Your Steps

1. On the map of the park, 1 cm represents 100 m.



E— Entrance
P— Parking lot
S— Stadium
M— Music centre
A— Art exhibit

What is the distance?

- a) from the entrance to the parking lot
- b) from the parking lot to the stadium
- c) from the parking lot to the music centre
- d) from the entrance to the art exhibit

2. To show distances on a map of the amusement park, let 1 cm represent 100 m. What length on your map would show that the distance

- a) from the beach to the ballpark is 800 m?
- b) from the entrance to the beach is 650 m?
- c) from the entrance to the ballpark is 775 m?
- d) from the entrance to the tennis courts is 500 m?

4. 15 teams of students decided to clean up the park. If each team collected 45 pieces of garbage, how many pieces did they collect?

6. A tree survey in the park showed that there were 43 maples, 17 oaks, and 13 elms. How many trees in the park were surveyed?

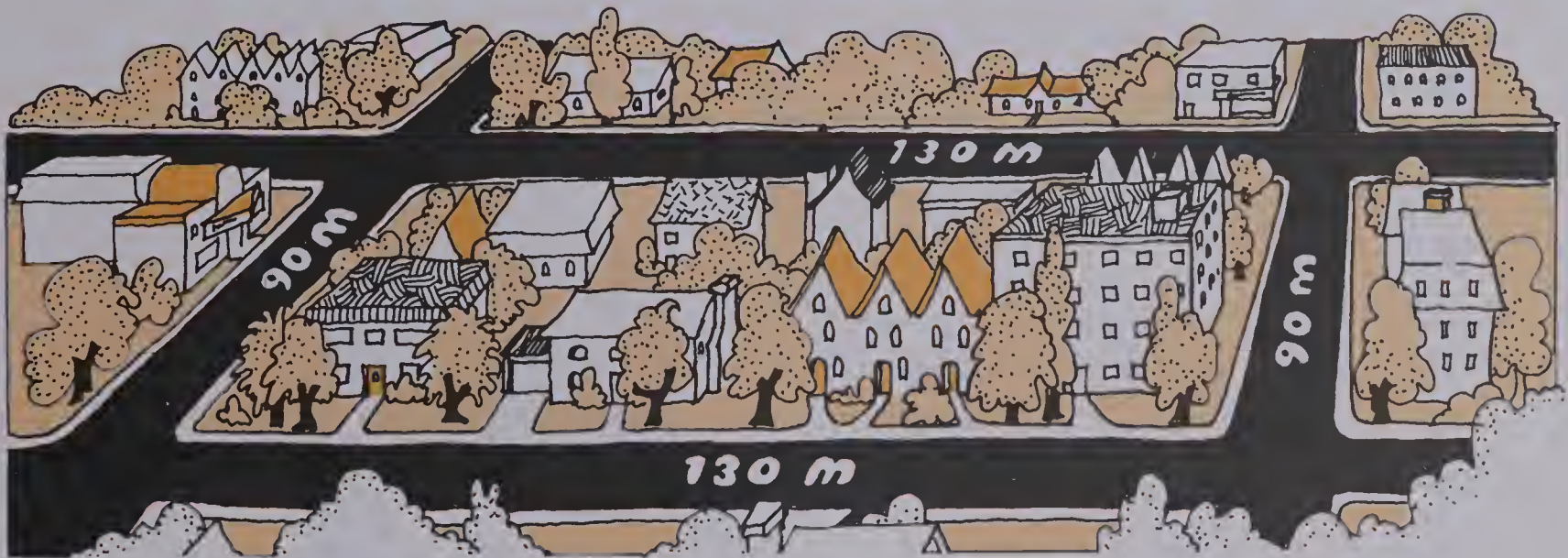
3. Mr. Freestone's class found that there were 40 houses on a city block. If an average of 3.5 persons live in each house, approximately how many people live in the city block?

5. The first Olympic marathon race was run in 1896 in honour of Pheidippides, a Greek soldier. In 490 B.C., Pheidippides ran from Marathon to Athens. How many years passed before the race was introduced into the Olympic games?

EXPLORE

PERIMETER

The **perimeter** of an object is the distance around it.



Angelo walked around this city block.
How far did he walk?

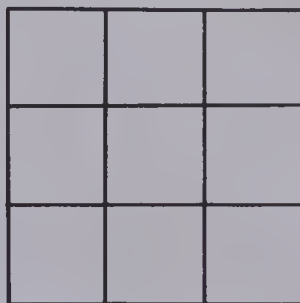
What is the perimeter of the city block?

On 1 cm graph paper, draw a figure like this.



What is the perimeter of the figure?

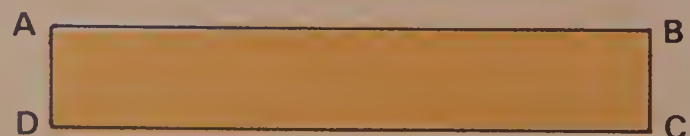
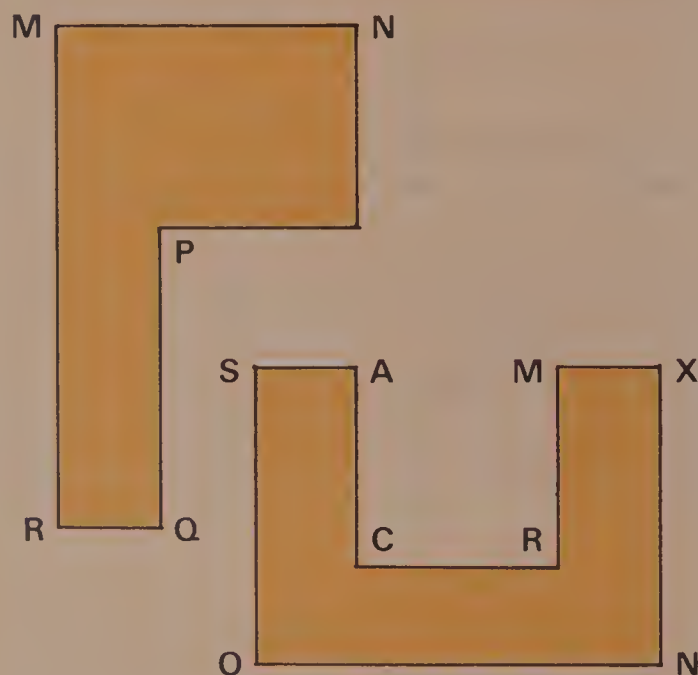
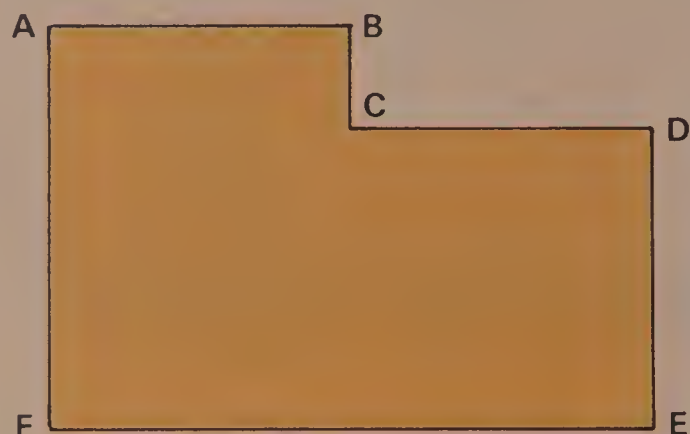
If the nine 1 cm squares were cut out
and rearranged like this,
what would be the perimeter?



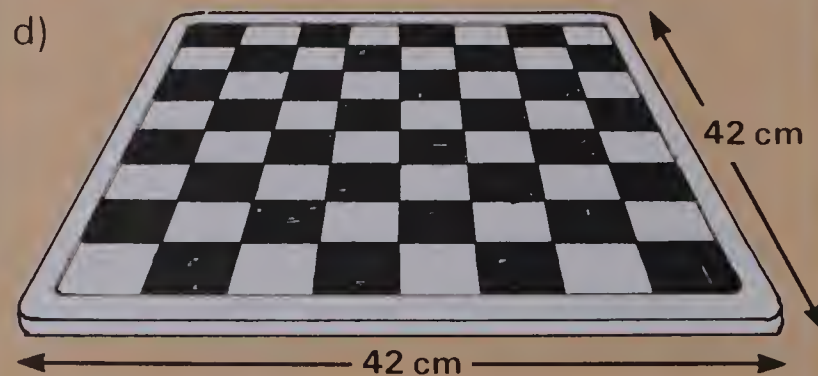
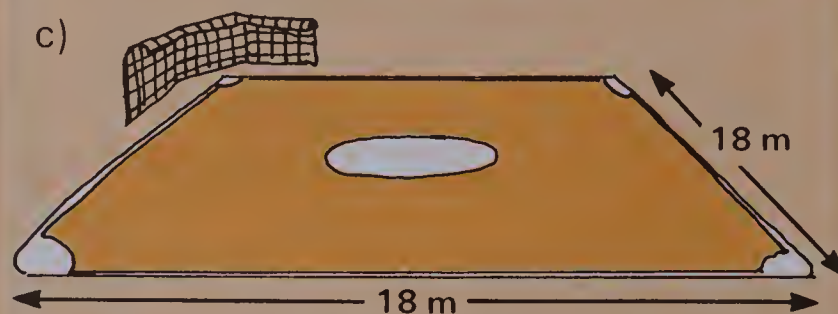
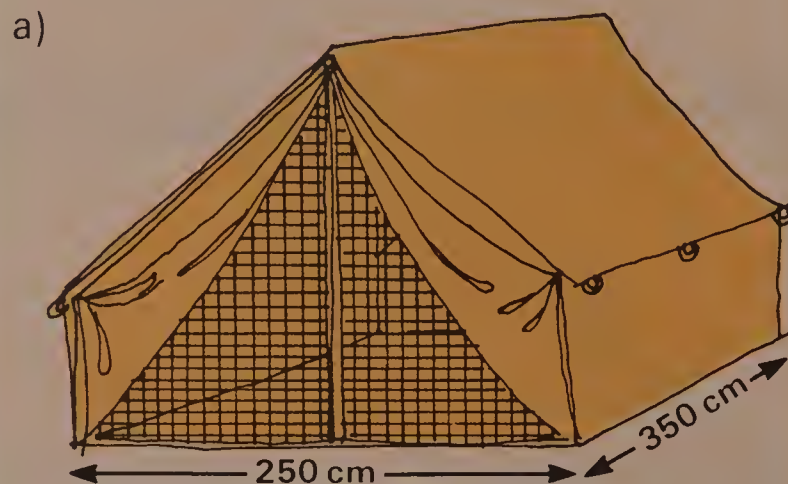
Draw or construct other figures,
each containing nine 1 cm squares,
that have perimeters of 14 cm, 16 cm.



1. Measure to find the perimeter of each figure.
Express each perimeter in
a) millimetres b) centimetres
c) metres.

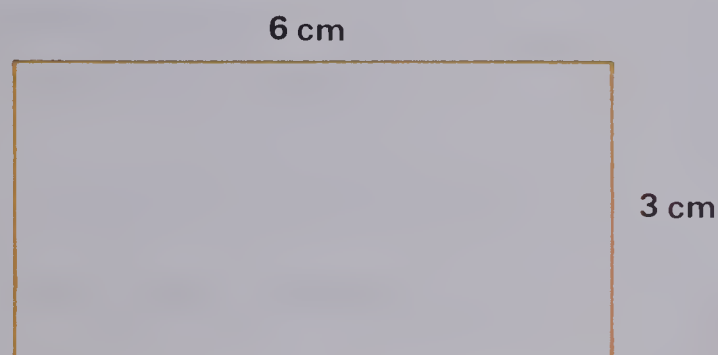


2. Find the perimeter of each.

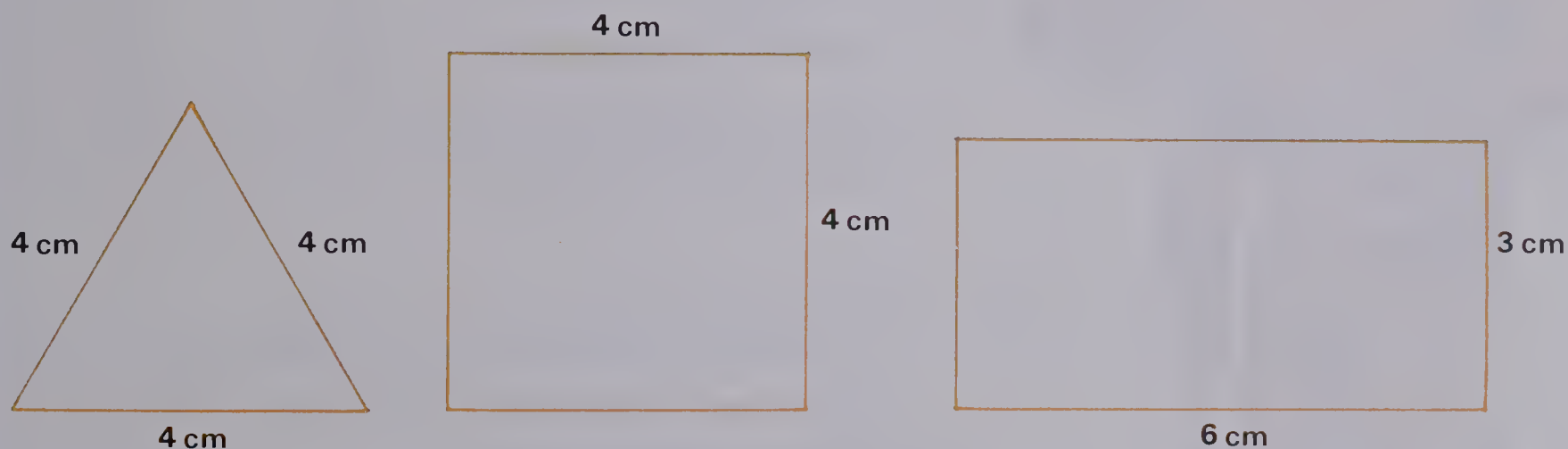




3. Find the perimeter of this figure.



Draw as many different rectangles as you can
each with the same perimeter.



4. Trace and cut out models of these 3 figures.

Use 2 or 3 of the shapes
to create new shapes with perimeters of

- a) 20 cm b) 26 cm c) 28 cm d) 22 cm e) 24 cm f) 34 cm

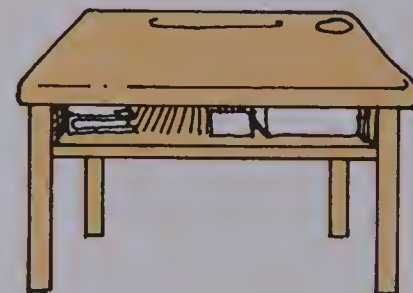
5. a) Draw a pattern of a
2 cm by 2 cm by 2 cm cube.
Find the perimeter of the pattern.

- b) Does every pattern for a
2 cm by 2 cm by 2 cm cube
have the same perimeter?

- c) Find the perimeter
of a pattern of a
3 cm by 3 cm by 3 cm cube.



6. a) How many sides do you need to measure to find the perimeter of your desk?
- b) Find the perimeter.
- c) Describe the method you used.



7. a) Why do you need to know the length of just 1 side of a square to find its perimeter?



25 mm

- b) Without measuring find the perimeter of this square.

8. a) What is the perimeter of your waist in centimetres? You would need to know your waist measurement for buying what pieces of clothing?

- b) What is the perimeter of your head in centimetres? You would need to know your head measurement for buying what piece of clothing?

- c) What is the perimeter of your neck in centimetres? You would need to know your neck measurement for buying what piece of clothing?

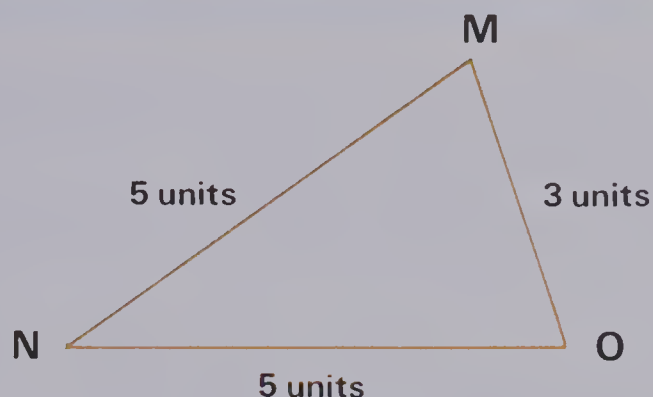
- d) Measure the perimeter of your ring finger in millimetres.



Calculating Perimeter

The length of the sides of this triangle ($\triangle MNO$) are 5 units, 3 units, and 5 units. We can find the perimeter by addition.

$$p = 5 + 3 + 5$$

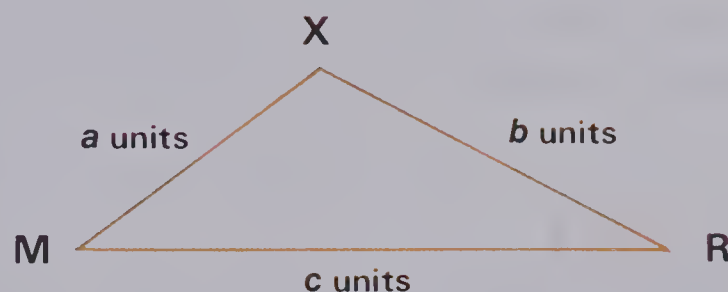


We can write a rule for finding the perimeter of $\triangle XMR$:

$$p = a + b + c$$

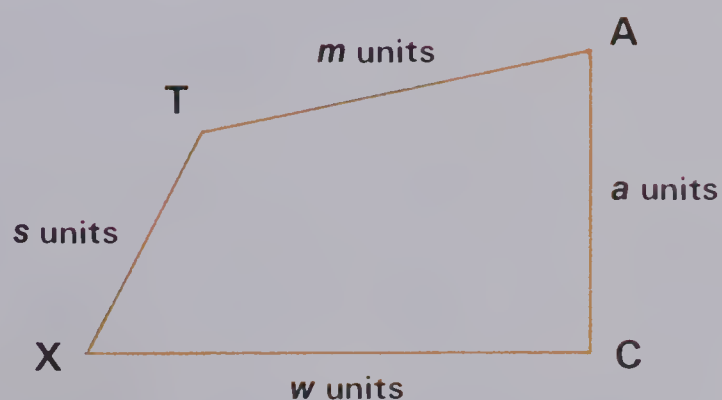
Measure each side of $\triangle XMR$ to find a , b , and c .

Find the perimeter of $\triangle XMR$.



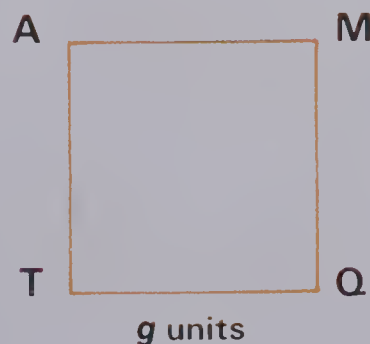
What rule would you write for finding the perimeter of quadrilateral TACX?

Measure each side of the quadrilateral. Replace the letter symbols by numbers and find the perimeter.



Why is $p = 4 \times g$ units a good rule for finding the perimeter of a square?

Find the number represented by g in square AMQT and then find the perimeter.





In this diagram, l units represent the length and w units represent the width.

The rule for finding the perimeter of a rectangle is

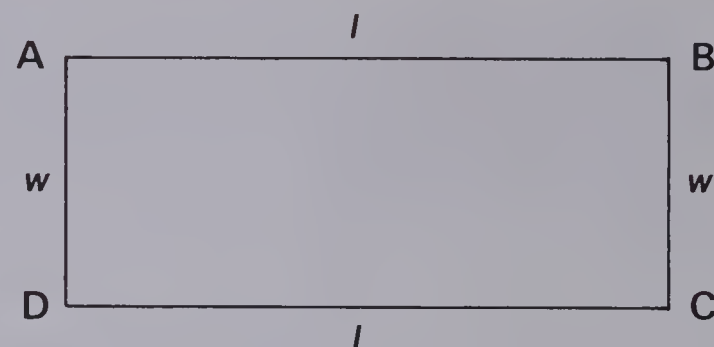
$$p = l + l + w + w$$

Why is the following also a good way of writing the rule?

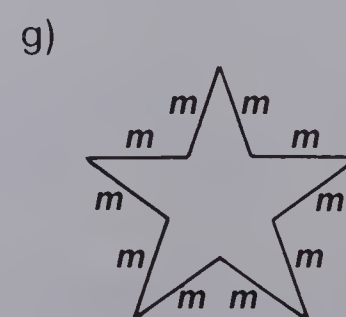
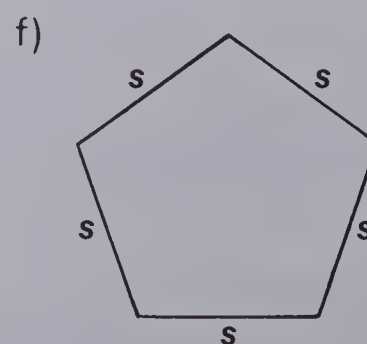
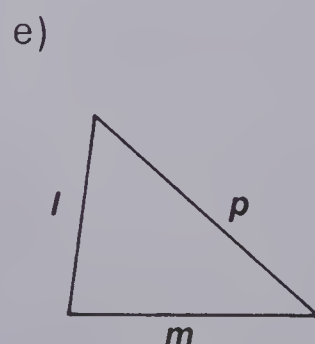
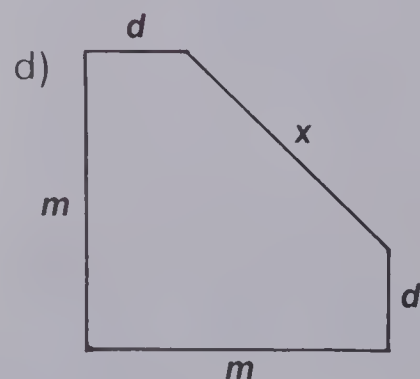
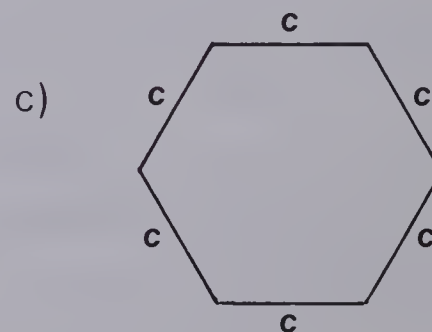
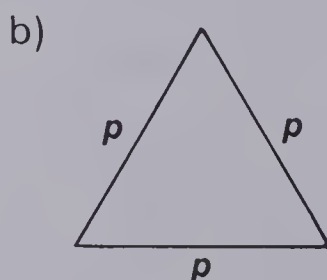
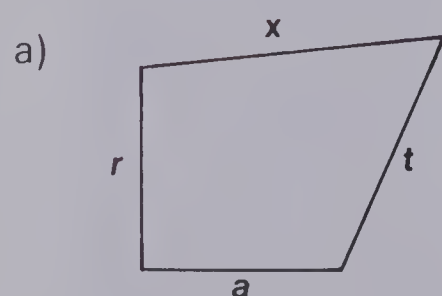
$$p = 2 \times l + 2 \times w$$

Measure to find l and w for rectangle ABCD.

Find the perimeter.



- Write a rule for finding the perimeter of each figure. Measure and find the perimeter.





Perimeter

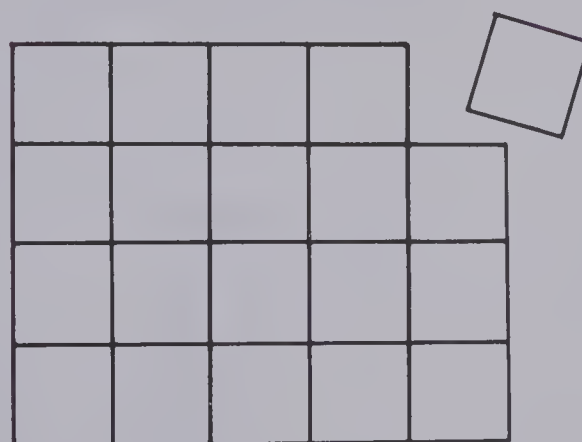
Cut twenty 1 cm squares from graph paper and arrange them in a 5 cm by 4 cm array.

What is the perimeter of the region?



Now remove one 1 cm square from a corner of the array. What is the perimeter of the region now?

Why does the perimeter remain unchanged?



Remove another corner square. What is the perimeter now?



How many squares can you remove without changing the perimeter?

Explain why the perimeter does not change.

EXPLORE

MULTIPLICATION/A 3- or 4-Digit Factor by a 1-Digit Factor

Multiply 687 by 9.

Meaning

$$\begin{array}{r} 687 \\ 9 \\ \hline 63 \\ 720 \\ 5400 \\ \hline 6183 \end{array} \quad \begin{array}{l} 7 \times 9 \\ 80 \times 9 \\ 600 \times 9 \end{array}$$

Algorithm

$$\begin{array}{r} 687 \\ 9 \\ \hline 6183 \end{array}$$

Think Record

63	3
72, 78	8
54, 61	61

Check by estimating: Since 687×9 is about 700×9 or 6300, the product is reasonable.

Multiply 3658 by 7.

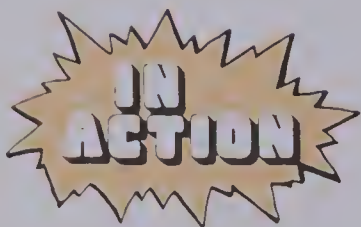
$$\begin{array}{r} 3\ 658 \\ 7 \\ \hline 56 \\ 350 \\ 4\ 200 \\ 21\ 000 \\ \hline 25\ 606 \end{array} \quad \begin{array}{l} 8 \times 7 \\ 50 \times 7 \\ 600 \times 7 \\ 3\ 000 \times 7 \end{array}$$

$$\begin{array}{r} 3\ 658 \\ 7 \\ \hline 25\ 606 \end{array}$$

Think Record

56	6
35, 40	0
42, 46	6
21, 25	25

Since $4000 \times 7 = 28\ 000$, the product is reasonable.



1. Find the product. Check by estimating.

- | | | | | |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| a) 543×6 | b) 278×7 | c) 349×4 | d) 685×8 | e) 709×3 |
| f) 836×9 | g) 2436×5 | h) 3108×4 | i) 4265×6 | j) 5378×3 |
| k) 6019×7 | l) 4253×9 | m) 198×7 | n) 907×8 | o) 6359×7 |
| p) 4879×8 | q) 7643×9 | r) 8739×8 | | |

2. 1 ℓ of water has a mass of 1000 g, and 1 ℓ of gasoline has a mass of about 682 g. About what is the mass of 8 ℓ of gasoline?

3. 1 ℓ of milk has a mass of about 1023 g. About what is the mass of 8 ℓ of milk?



Placing the Decimal Point in a Product

Multiply.

687 by 0.9

68.7 by 9

68.7 by 0.9

In each case the digits in the product are
6183

687×0.9 is about

687×1 or 687

$687 \times 0.9 = 618.3$

68.7×9 is about

70×9 or 630

$68.7 \times 9 = 618.3$

68.7×0.9 is about

69×1 or 69

$68.7 \times 0.9 = 61.83$

For each case above consider:

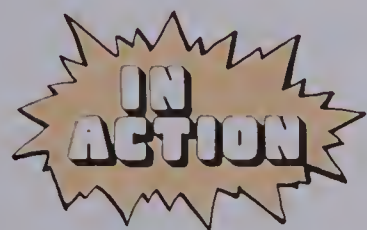
How many digits are there

to the right of the decimal point in

a) the first factor b) the second factor c) the product?

What is your rule

for placing the decimal point in a product?



1. The product of 3658×7 is 25 606.

What is the product of

a) 365.8×7

b) 365.8×0.7

c) 36.58×7

d) 36.58×0.7

e) 3.658×7

f) 3.658×0.7

g) 0.3658×7

h) 0.3658×0.7 ?

2. Multiply.

a) 24.8

6

b) 36.9

0.4

c) 435.8

5

d) 2186

0.8

e) 73.04

0.3

f) 59.62

0.4

g) 78.9

0.9

h) 24.35

0.7

i) 612.8

0.3

j) 87.19

0.9



A 2-Digit Factor by a 2-Digit Factor

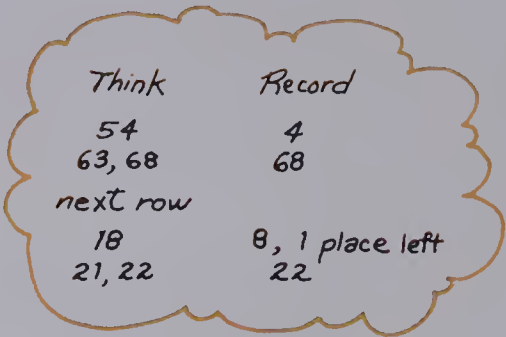
Multiply 76 by 39.

Meaning

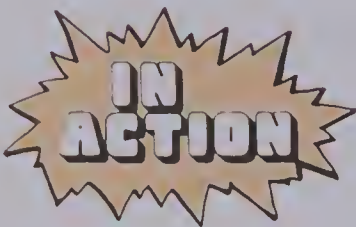
76	
<u>39</u>	
54	6×9
630	70×9
180	6×30
<u>2100</u>	70×30
2964	

Algorithm

76
<u>39</u>
684
<u>228</u>
2964



Since 76×39 is about 80×40 or 3200, the product is reasonable.



1. Multiply.

- | | | | | | |
|--|--|--|--|--|--|
| a) $\begin{array}{r} 33 \\ 24 \\ \hline \end{array}$ | b) $\begin{array}{r} 45 \\ 19 \\ \hline \end{array}$ | c) $\begin{array}{r} 49 \\ 28 \\ \hline \end{array}$ | d) $\begin{array}{r} 39 \\ 43 \\ \hline \end{array}$ | e) $\begin{array}{r} 56 \\ 27 \\ \hline \end{array}$ | f) $\begin{array}{r} 63 \\ 34 \\ \hline \end{array}$ |
| g) $\begin{array}{r} 72 \\ 29 \\ \hline \end{array}$ | h) $\begin{array}{r} 78 \\ 36 \\ \hline \end{array}$ | i) $\begin{array}{r} 84 \\ 37 \\ \hline \end{array}$ | j) $\begin{array}{r} 89 \\ 35 \\ \hline \end{array}$ | k) $\begin{array}{r} 96 \\ 47 \\ \hline \end{array}$ | l) $\begin{array}{r} 98 \\ 59 \\ \hline \end{array}$ |

2. Shauna's car averages 6 l / 100 km. How far would the car travel if it used 36 l of gasoline?

4. Main Street School has 18 rooms with an average of 28 students per room. How many students attend the school?

5. The parking lot has room for 19 rows of cars with 38 cars in each row. How many cars will the lot hold?

3. Judy has 45 pages of stamps in her album with 24 stamps on each page. How many stamps are in the album?





A 2-Digit Factor by a 2-Digit Factor/Decimals

Multiply.

76 by 0.39

0.76 by 39

7.6 by 3.9

In each case, the digits in the product are
2964

76×0.39 is about

80×0.4 or 32

$76 \times 0.39 = 29.64$

0.76×39 is about

0.7×40 or 28

$0.76 \times 39 = 29.64$

7.6×3.9 is about

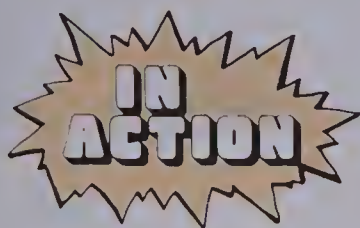
8×4 or 32

$7.6 \times 3.9 = 29.64$

For each case above consider:

How many digits are there
to the right of the decimal point in

a) the first factor b) the second factor c) the product?



1. Multiply.

a) $\begin{array}{r} 87 \\ 4.6 \end{array}$

b) $\begin{array}{r} 87 \\ 0.46 \end{array}$

c) $\begin{array}{r} 8.7 \\ 4.6 \end{array}$

d) $\begin{array}{r} 0.87 \\ 0.46 \end{array}$

e) $\begin{array}{r} 39 \\ 5.4 \end{array}$

f) $\begin{array}{r} 52 \\ 6.8 \end{array}$

g) $\begin{array}{r} 7.3 \\ 4.9 \end{array}$

h) $\begin{array}{r} 6.9 \\ 0.25 \end{array}$

i) $\begin{array}{r} 0.78 \\ 3.7 \end{array}$

j) $\begin{array}{r} 9.4 \\ 3.8 \end{array}$

k) $\begin{array}{r} 79 \\ 0.95 \end{array}$

l) $\begin{array}{r} 6.8 \\ 9.7 \end{array}$

m) $\begin{array}{r} 0.65 \\ 29 \end{array}$

n) $\begin{array}{r} 0.19 \\ 83 \end{array}$

o) $\begin{array}{r} 74 \\ 0.93 \end{array}$

p) $\begin{array}{r} 8.8 \\ 9.9 \end{array}$

q) $\begin{array}{r} 7.9 \\ 1.1 \end{array}$

r) $\begin{array}{r} 0.11 \\ 0.22 \end{array}$

2. Each side of a regular hexagon is 9.8 cm long.
What is the perimeter of the hexagon?

3. Mrs. Rogers drives downtown 5 d a week.
From her home to her law office is 9.6 km.
How far does she commute each week?



EXPLORE

DEVELOPMENT OF PROBLEM SOLVING/Word Problems

Problem

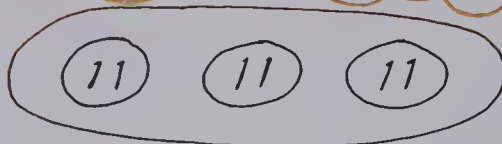
Laurier Middle School ordered
25 packages of rulers
with 10 rulers in a package.
How many rulers did they order?

To understand a problem, it helps to:

1. think of an easier example
2. illustrate the example.

Think

*If the school ordered 3 packages
of rulers with 2 rulers in a package,
how many rulers did the school order?*

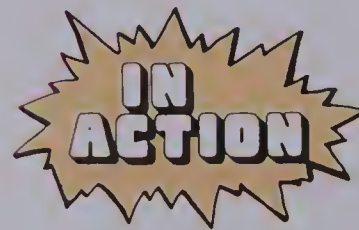


$$3 \times 2 = 6$$

The school ordered 6 rulers.
Multiplication is the key.

Solution

25 packages of rulers
10 rulers in a package
 $25 \times 10 = 250$
The school ordered 250 rulers.



1. A train carries 350 passengers.
If it makes 8 trips a day,
how many passengers will it carry?
2. A concession stand at the Rodeo
served pancakes. They made
240 pancakes per hour for 5 h.
How many pancakes did they make?

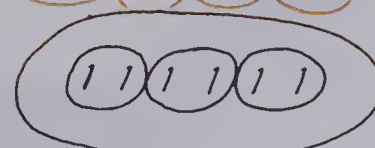


Problem

Laurier Middle School ordered 250 rulers. If there are 10 rulers in a package, how many packages did they order?

Think

If there are 2 rulers in a package, how many packages did the school order?



$$6 \div 2 = 3$$

The school ordered 3 packages.
Division is the key.

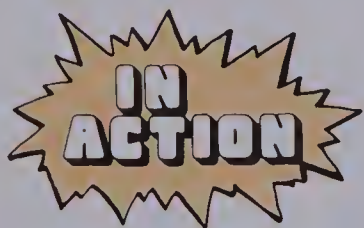
Solution

250 rulers

10 rulers in a package

$$250 \div 10 = 25$$

The school ordered 25 packages.



1. A truck can carry 12 m^3 of soil.
A building site needs 300 m^3 of soil removed.
How many trips must this truck make to remove the soil?
2. A school playing field will have 25 equal areas for playday activities.
The area of the field is $16\,750 \text{ m}^2$.
What area is allowed for each activity?



3. Pierre picked strawberries for 16 d.
He earned \$5.75/d.
How much did he earn in 16 d?

4. There are 195 school days in 1 a.
A school receives a grant of \$7.00 a
day for each student. How much money
will a school receive in 1 a
for 1 student?

5. The Le Brun family travelled 4200 km
on their summer holiday. If they averaged
300 km/d, how many days
did they travel?



6. Gina read 17 pages in 1 h.
It took her 14 h to read the book.
How many pages were there?

7. A theatre sold 850 tickets at \$3.00.
How much money did they receive
in ticket sales?

8. 350 l of milk is picked up at a farm
3 times a week.
How much milk is collected each week?

9. The average traffic flow on a highway
is 341 vehicles a day.
How many vehicles will drive on
the highway in a 30 d month?



10. A letter carrier walks an average
of 15 km/d. If he worked 245 d,
how many kilometres would
he walk?

11. Chingsum called her parents
in Hong Kong.
It cost her \$84.00 for 7 min.
What was the cost for 1 min?

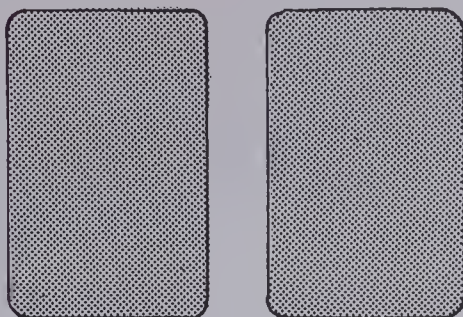
EXPLORE

CONGRUENCE

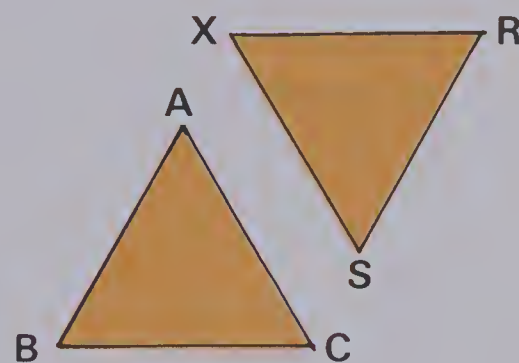
Congruent shapes
are shapes that are the same size
and same shape.



These 2 flowers
are congruent.
They are the
same size and shape.



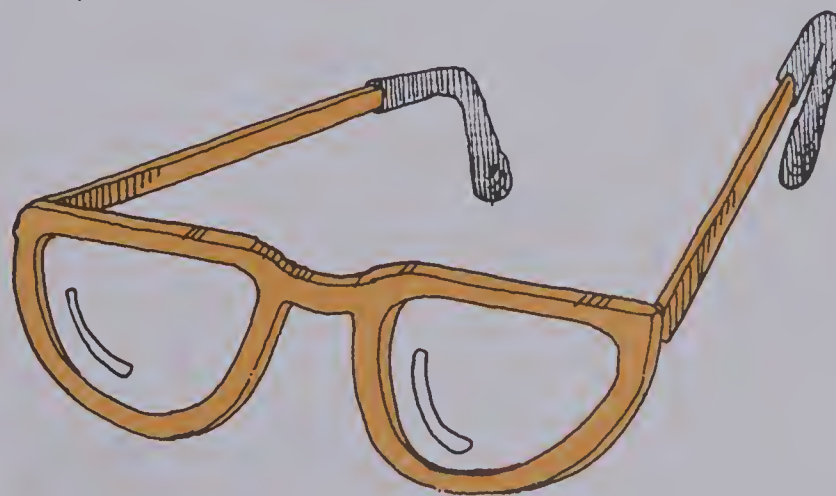
Playing cards in a
deck are congruent.
They are the same
size and shape.



$\triangle ABC$ is congruent
to $\triangle XRS$. They are
the same size and shape.



What congruent shapes do you see here?
Why is congruence an important
concept in nature?



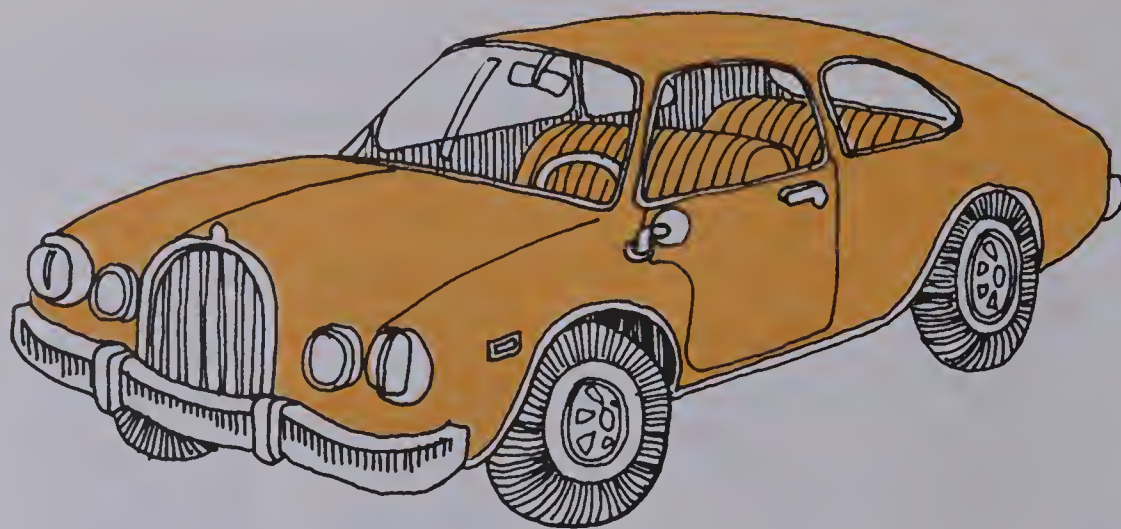
What congruent shapes do you see here?
Why is congruence an important
concept to people?

Look around outdoors. Make a list of congruent shapes you see.
Include some shapes from nature.

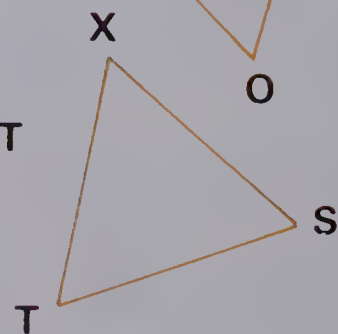
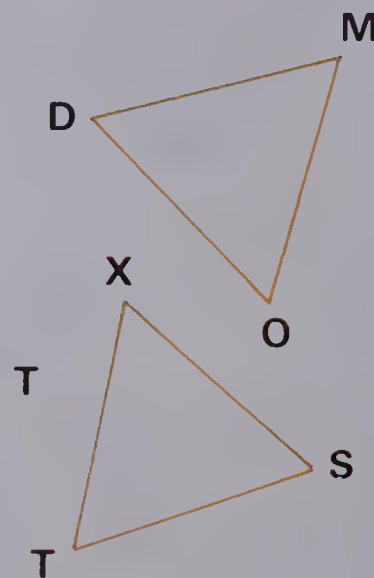
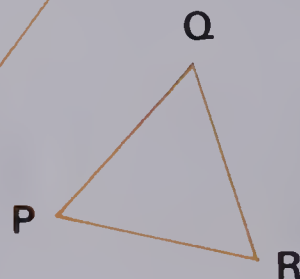
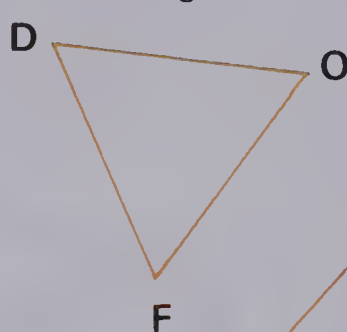
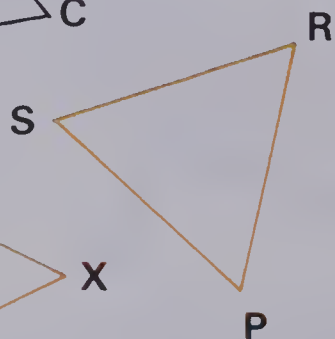
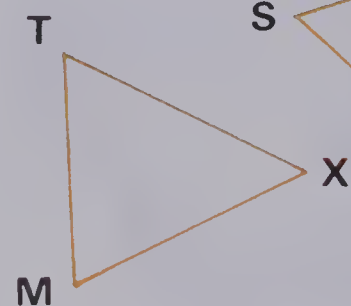
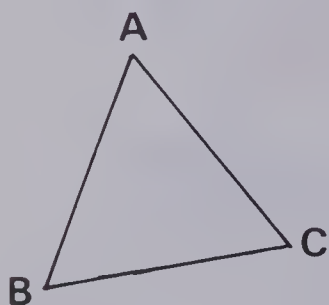
Look around your classroom.
Make a list of congruent shapes you see.



1. Make a list of congruent parts on an automobile.



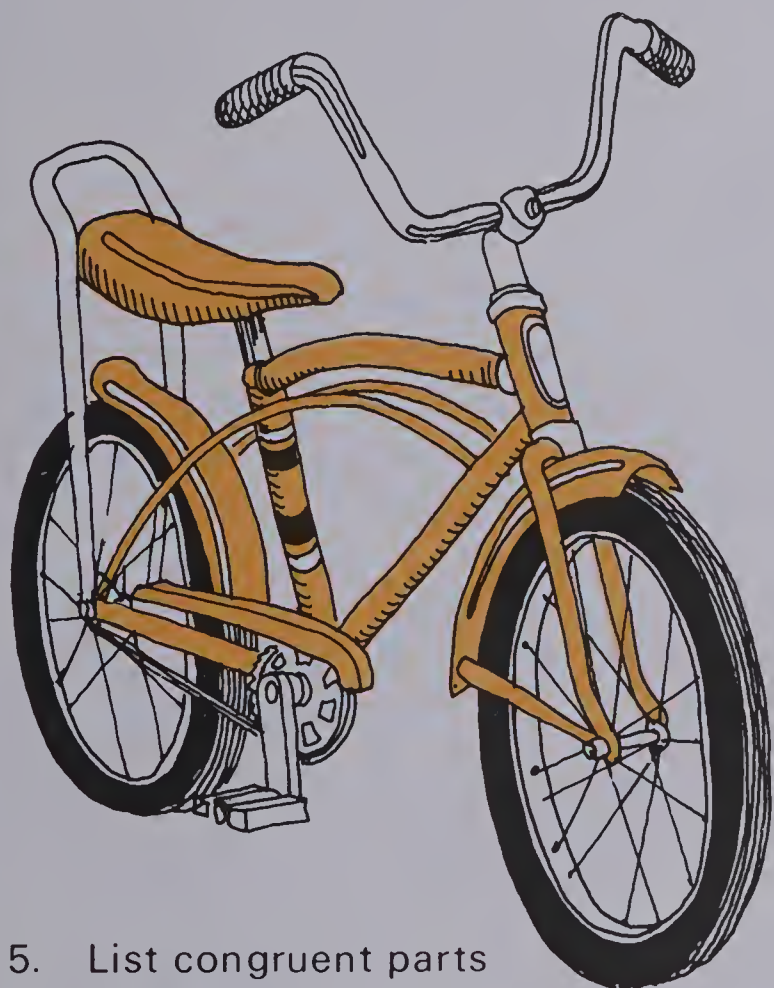
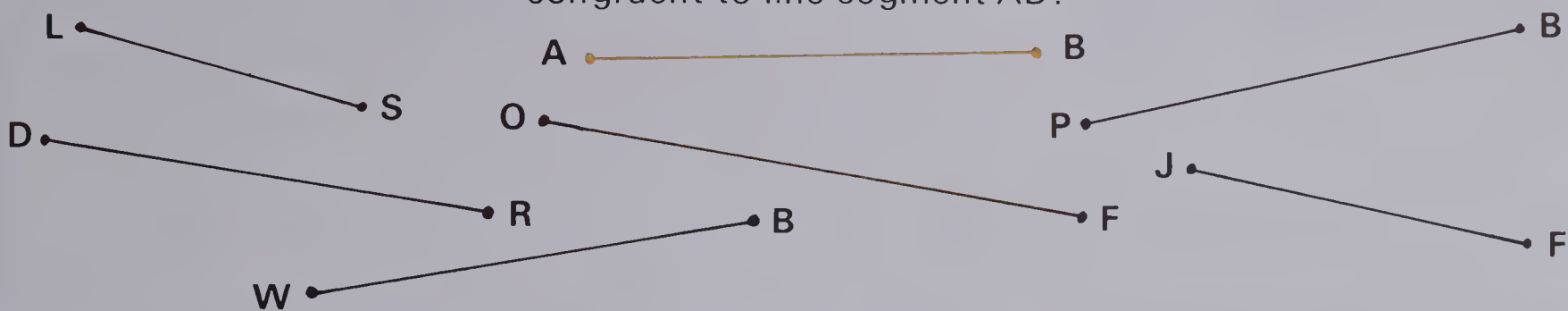
2. Trace and cut out a model of this triangle. Use your model to find which of these triangles is congruent to $\triangle ABC$.



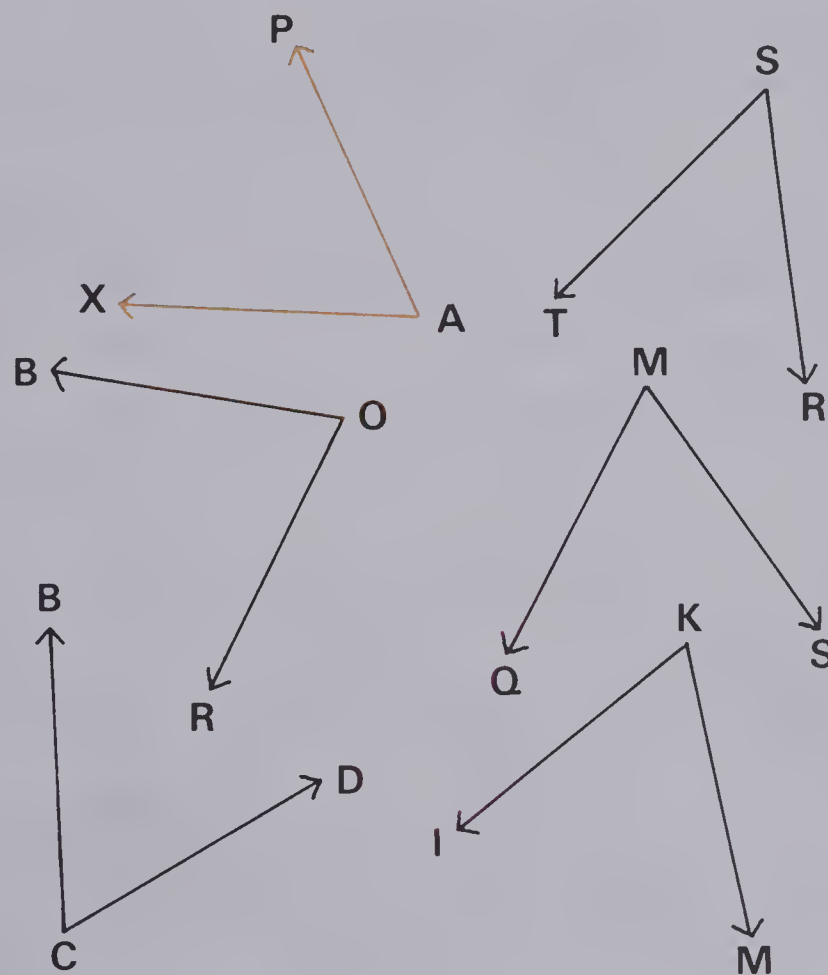
3. Make a list of congruent shapes on a regulation hockey rink.



4. Which line segments are congruent to line segment AB?



5. List congruent parts you can find on a bicycle.



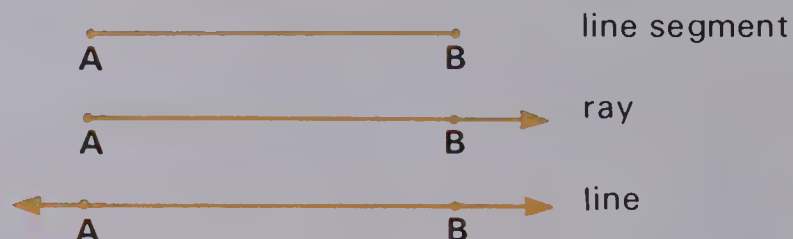
6. Trace and cut out a model of $\angle XAP$.
Use your model to find the angles congruent to $\angle XAP$.

7. How many different ways can you fold a square to create 4 congruent parts?

EXPLORE

ANGLES

When 2 rays have a common endpoint, the figure is called an **angle**.



Name the 2 rays that form the angle.

Name the common endpoint.

We call this angle $\angle AMS$ (angle AMS) or $\angle SMA$.

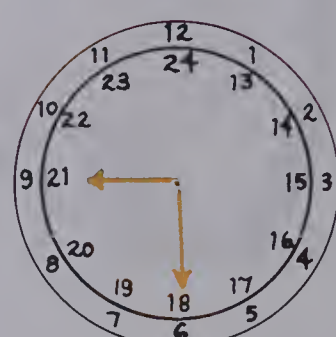
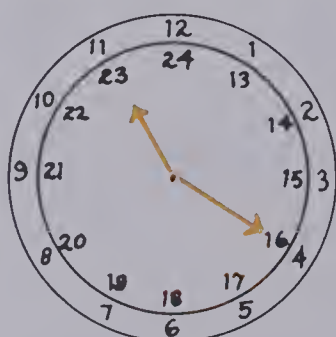


The hands of a clock can form many different angles.

Do you see the angle formed here?



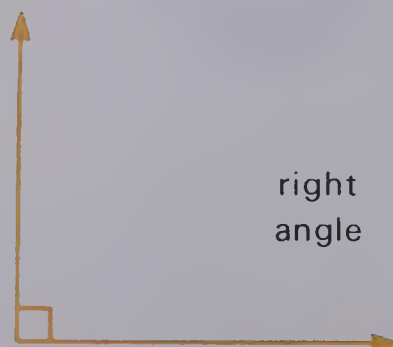
Draw the angles formed by the hands of these clocks.



When the hands of a clock show 03:00, the hands form this angle.

We call this angle a **right angle**.

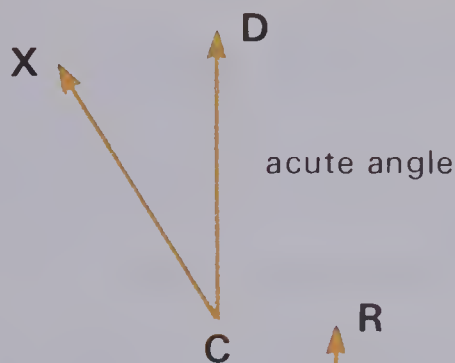
Name 5 other times when the hands of a clock form right angles (approximately).





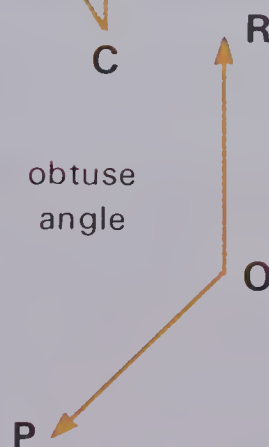
When the hands of a clock show 22:00, the hands form an **acute angle**.

Name 5 other times when the hands form an acute angle.



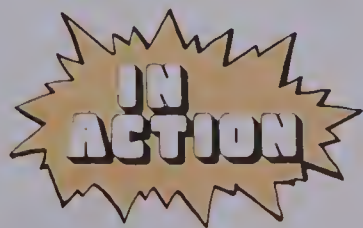
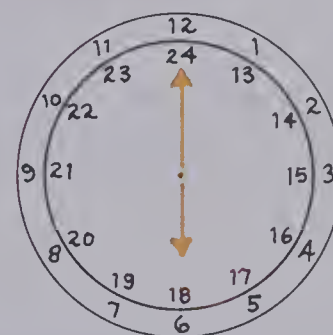
When the hands show 19:00, the hands form an **obtuse angle**.

Name 5 other times when the hands form an obtuse angle.

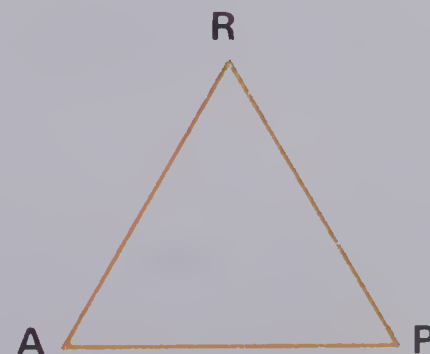
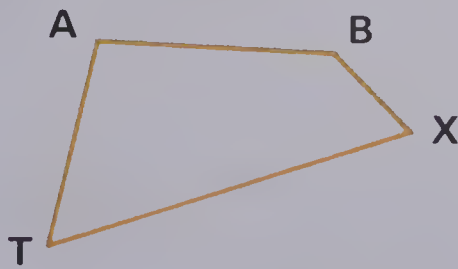
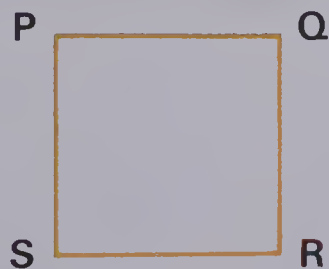
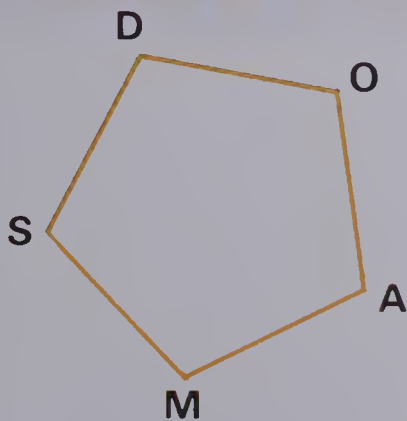


When the hands show 06:00, the hands form a **straight angle**.

Name 5 other times when the hands form a straight angle (approximately).



- a) Name 3 acute angles, 3 obtuse angles, and 3 right angles found in these polygons.

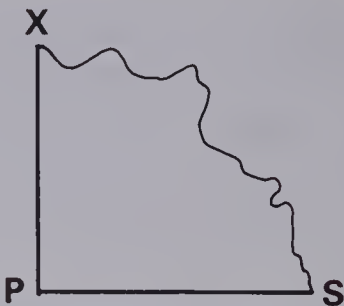


- b) Why do you not find any straight angles in polygons?



2. a) Draw and name 5 different angles.

b) Trace and cut out a model of this right angle. Use it to test the angles you drew.



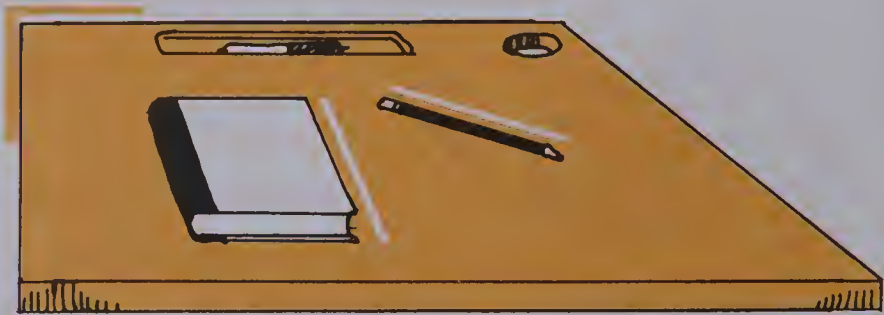
c) Sort the angles you drew. Use a chart like this.

Right angles	Acute angles	Obtuse angles	Straight angles

d) If you left out any kinds of angles, draw and name those kinds now.

3. Find, in your classroom, 3 models of

- a) an acute angle
- b) an obtuse angle
- c) a right angle
- d) a straight angle.



4. Tell whether the hands of a clock, at the indicated times, would form obtuse, right, acute, or straight angles.

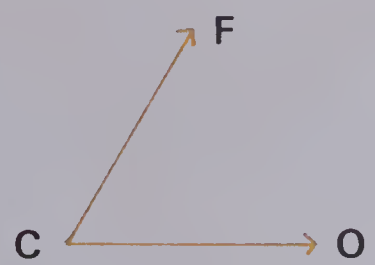
- a) 13:00 b) 06:00 c) 23:25 d) 23:00
- e) 03:32 f) 21:00 g) 18:00 h) 15:00
- i) 20:30 j) 15:20 k) 04:55 l) 19:05



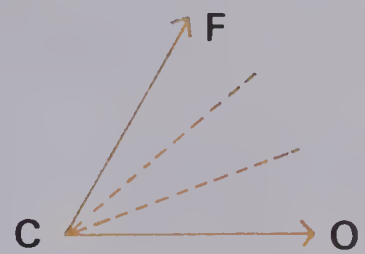
Measuring Angles



Trace and cut out a model of this angle.
Use it as a unit angle.



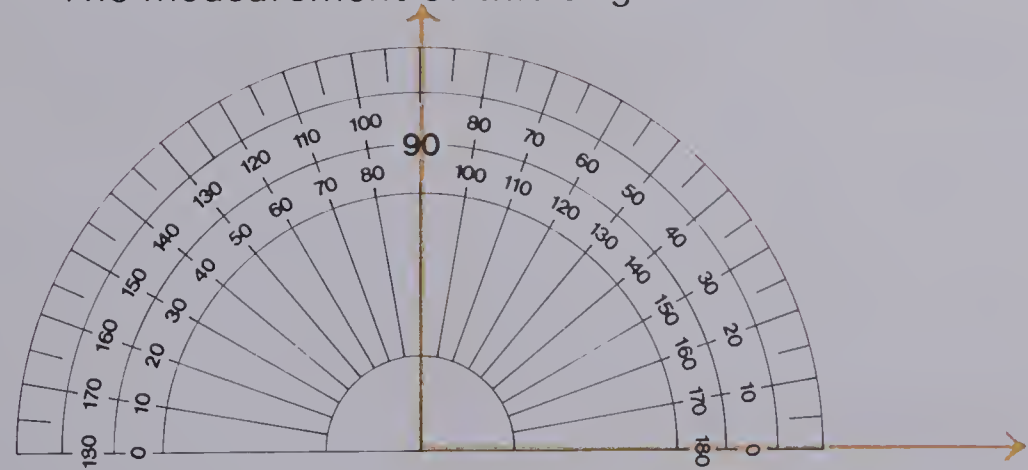
How many unit angles make up
or are contained in $\angle FCO$?



There are 3 unit angles contained in $\angle FCO$.
The measurement of $\angle FCO$ is 3 units.
The unit we usually use for
measuring angles is one **degree** (1°).



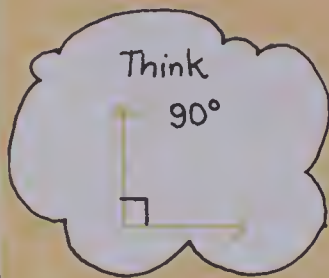
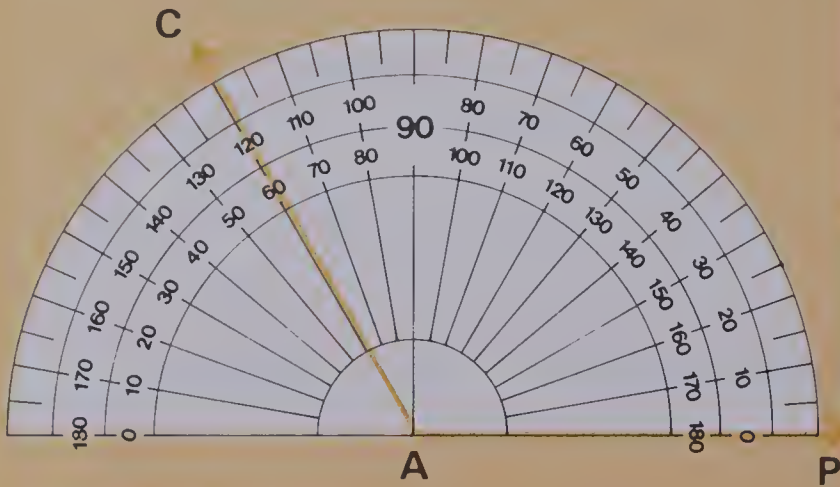
The measurement of this angle is 1° .



The measurement of this angle is 90° .
A right angle is 90° .

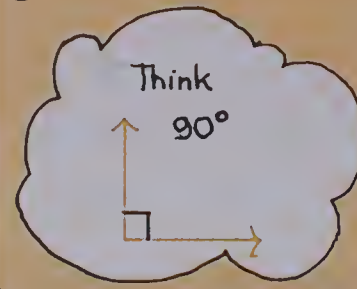
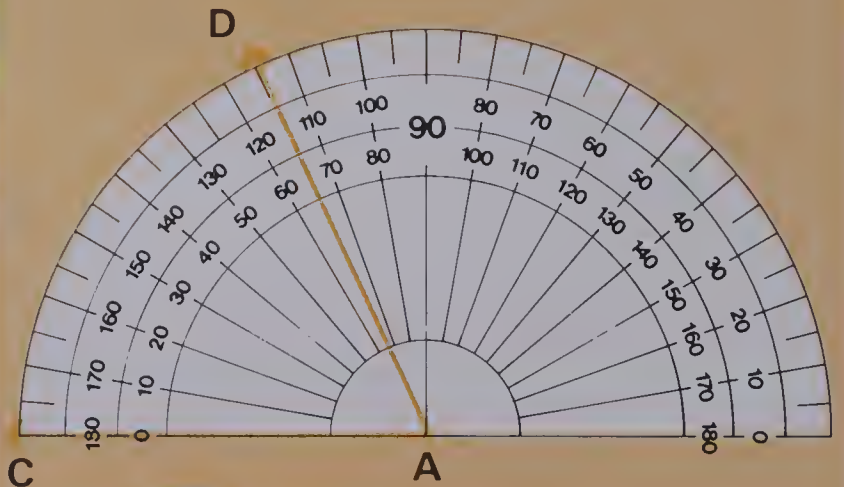


What is the measurement of $\angle CAP$?

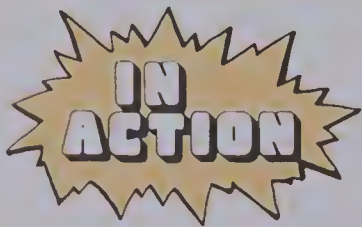


$\angle CAP$ is greater than 90° .
 $\angle CAP = 120^\circ$

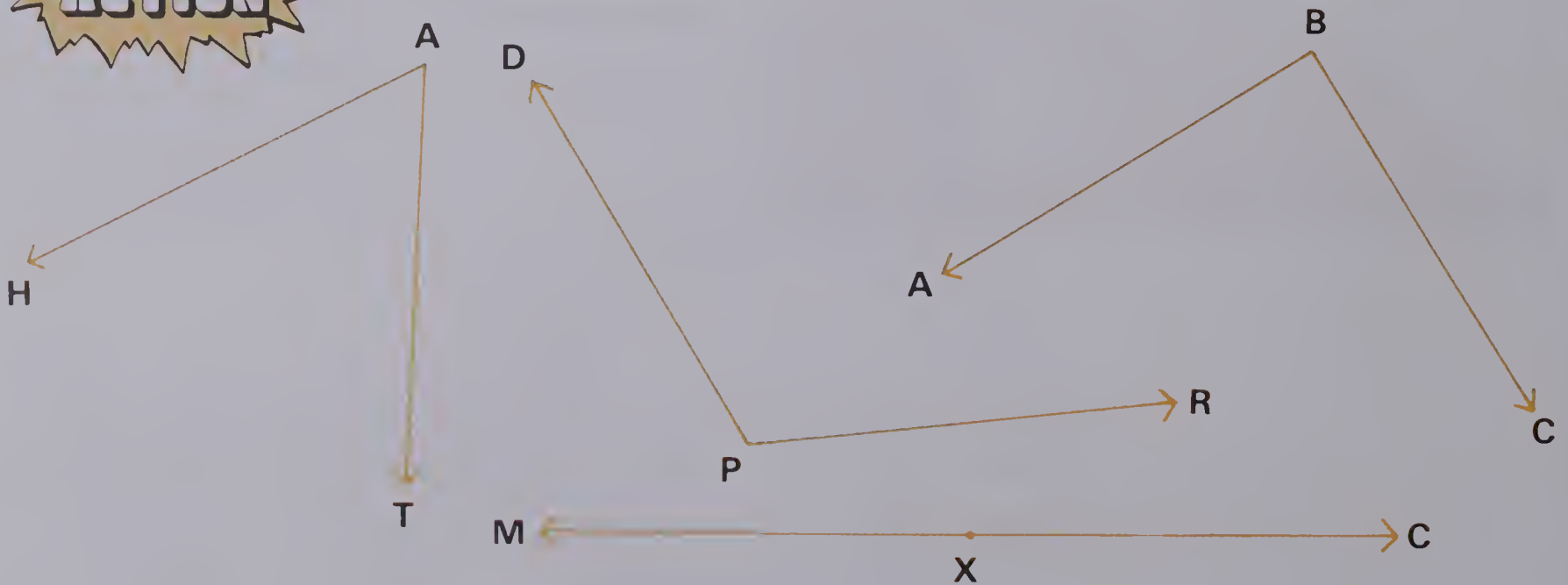
What is the measurement of $\angle DAC$?



$\angle DAC$ is less than 90° .
 $\angle DAC = 65^\circ$



1. Measure each angle with your protractor.

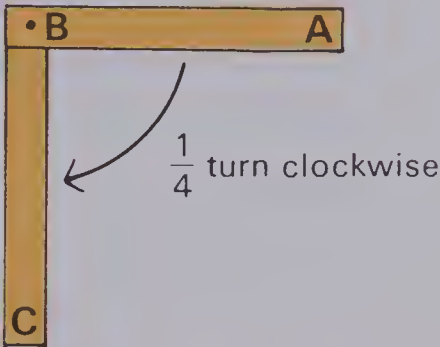




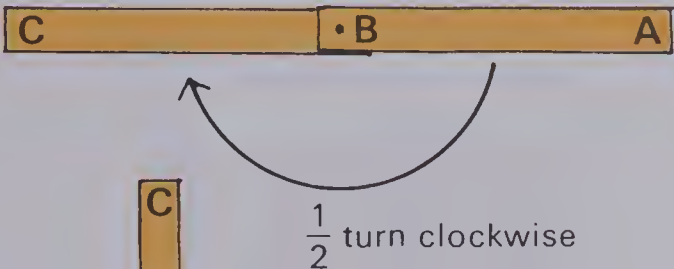
2. a) Cut 2 cardboard strips each about 7 cm long and 0.5 cm wide. Fasten the strips together at one end with a fastener so that the strips can rotate. The cardboard strips now form a model of an angle.



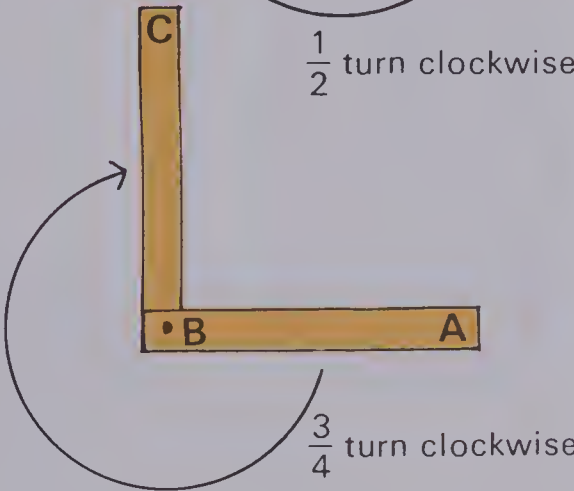
b) Hold arm AB in one place and rotate arm CB $\frac{1}{4}$ turn clockwise. What kind of angle is formed? What is the measurement of the angle?



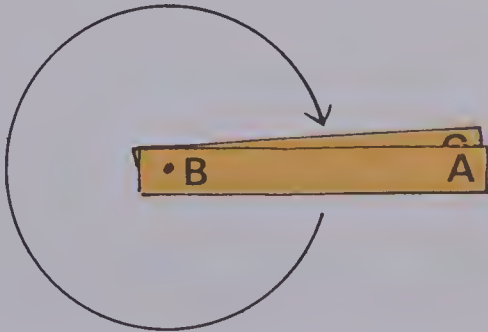
c) Hold arm AB in one place and rotate arm CB $\frac{1}{2}$ turn clockwise. What kind of angle is formed? What is the measurement of the angle?



d) Hold arm AB in one place and rotate arm CB $\frac{3}{4}$ turn clockwise. What kind of angle is formed? What is the measurement of the angle?



e) If the arm CB makes a complete turn, what is the measurement of the angle?



Retrace Your Steps

1. Cut out 4 square shapes.

Arrange them in different patterns so that at least one edge of one shape is touching the edge of another shape.

This way



Not this way



- a) What is the least perimeter you can make?
b) What is the greatest perimeter you can make?

2. Multiply.

- a) 100 by 20 b) 50 by 30 c) 150 by 100 d) 40 by 1000 e) 80 by 400
f) 4.5 by 100 g) 16.2 by 10 h) 1.5 by 20 i) 6.4 by 200 j) 10.9 by 1000

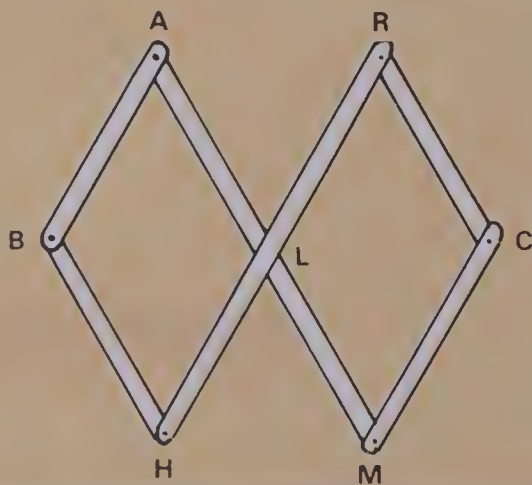
3. Find the product.

- a) 142×8 b) 430×5 c) 1469×4 d) 809×7 e) 6405×3
f) 34.2×2 g) 653×0.4 h) 5.12×8 i) 81.4×0.3 j) 51.64×0.5

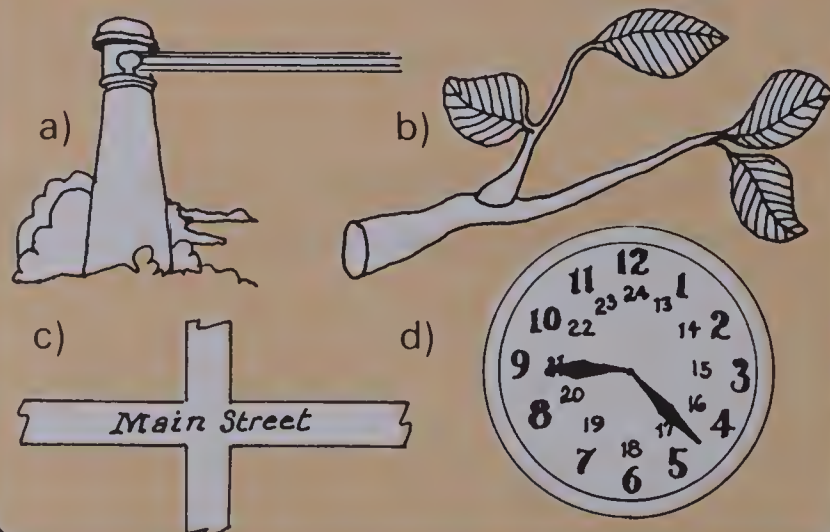
4. Multiply.

- | | | | | | |
|-----------|------------|-----------|-------------|-----------|-------------|
| a) 49 | b) 58 | c) 92 | d) 39 | e) 77 | f) 68 |
| <u>18</u> | <u>31</u> | <u>43</u> | <u>29</u> | <u>38</u> | <u>74</u> |
| g) 7.4 | h) 84 | i) 8.1 | j) 41 | k) 0.72 | l) 0.64 |
| <u>12</u> | <u>2.6</u> | <u>53</u> | <u>0.31</u> | <u>55</u> | <u>0.22</u> |

5. a) Name the obtuse congruent angles.
b) Name the acute congruent angles.



6. Name the kind of angle formed.



EXPLORE



CAPACITY/The Litre ℓ

milli (one thousandth)

millilitre (ml) 0.001 ℓ

litre

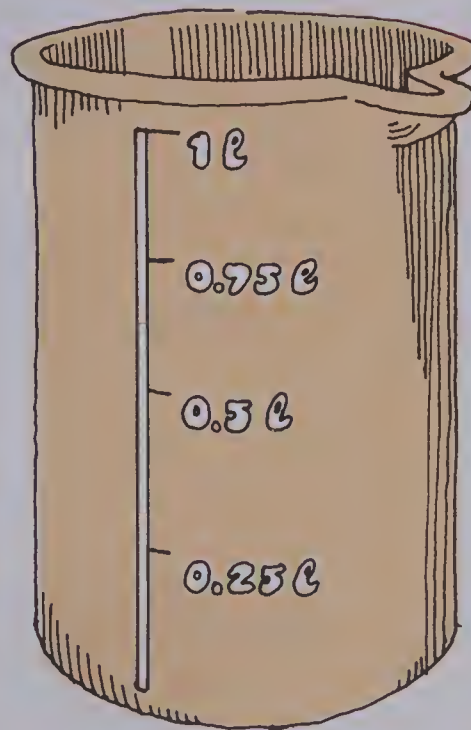
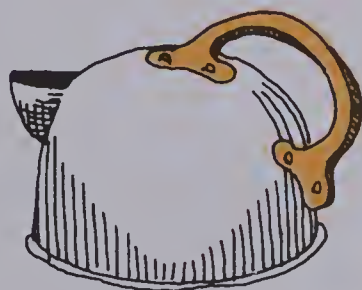
kilo (one thousand)

kilolitre (kl) 1000 ℓ

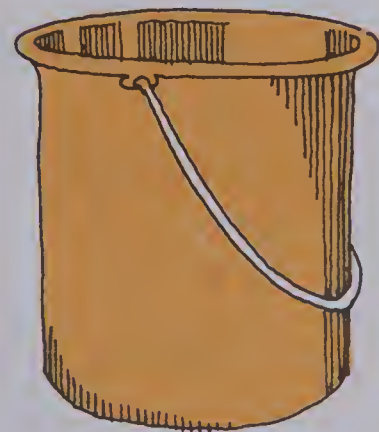
The litre is used to measure volumes of milk, paint, gasoline, anti-freeze, oil, water, and so on.

It is also used to measure capacities of kitchen pots, pans and kettles, pails, gas tanks, car radiators, oil tanks, and so on.

A kitchen tea kettle holds about 2.5 ℓ.



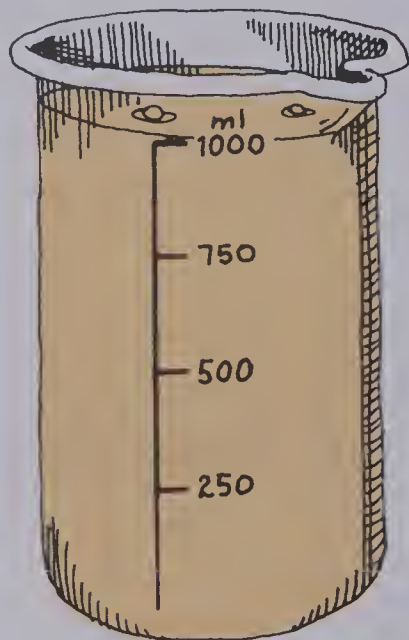
A household pail holds about 10 ℓ.



1. Make a list of liquids sold by the litre.
2.
 - a) Discover the capacity of the gas tank of 3 different makes of cars. Manufacturers' brochures contain this information.
 - b) About how many kilometres will each of the 3 cars travel on 1 ℓ of gasoline?

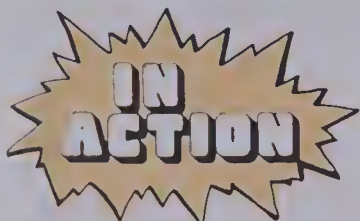


The Millilitre ml



$$1000 \text{ ml} = 1 \text{ l}$$

Use measuring spoons to measure the capacity of a drinking straw.



1. Complete.

a) $500 \text{ ml} = ? \text{ l}$

b) $10 \text{ ml} = ? \text{ l}$

c) $3.6 \text{ l} = ? \text{ ml}$

d) $0.125 \text{ l} = ? \text{ ml}$

e) $1700 \text{ ml} = ? \text{ l}$

f) $2 \text{ l} = ? \text{ ml}$

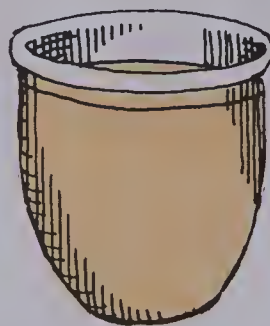
g) $3000 \text{ ml} = ? \text{ l}$

h) $257 \text{ ml} = ? \text{ l}$

2. Jamie drank 400 ml of milk for breakfast, 250 ml for lunch, and 500 ml for dinner. How many litres of milk did he drink that day?

3. Make a list of liquids sold by the millilitre. To help you, either visit a grocery store or look in the cupboards at home.

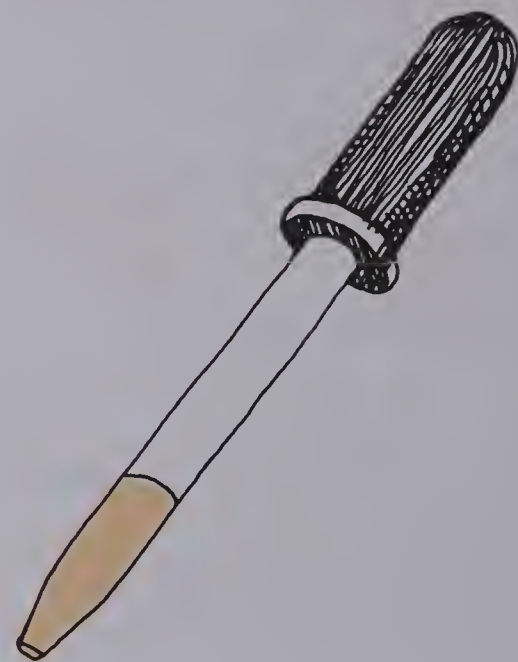
The millilitre is used to measure volumes of milk, soft drinks, shampoos, hand lotion, toothpaste, ice cream, vanilla extract, and so on.



$$250 \text{ ml}$$

$$0.250 \text{ l} (250 \div 1000)$$

Use measuring spoons to measure the capacity of a thimble.



About 20 drops of liquid are equivalent to 1 ml.





The Kilolitre kl

The kilolitre is used for measuring large volumes of liquids.

Volumes of swimming pools, oil tanks, tank trucks, and so on would be measured in kilolitres.



$$1 \text{ kl} = 1000 \text{ l}$$

$$2 \text{ kl} = 2000 \text{ l} (2 \times 1000)$$

$$175 \text{ l} = 0.175 \text{ kl} (175 \div 1000)$$



1. Complete.

a) $1000 \text{ l} = ? \text{ kl}$

b) $2 \text{ kl} = ? \text{ l}$

c) $900 \text{ l} = ? \text{ kl}$

d) $0.750 \text{ kl} = ? \text{ l}$

e) $8000 \text{ l} = ? \text{ kl}$

f) $3250 \text{ l} = ? \text{ kl}$

g) $1.9 \text{ kl} = ? \text{ l}$

h) $100 \text{ l} = ? \text{ kl}$

2. About how many times would you have to fill a 10 l pail to make 1 kl ?

3. A 150 cm by 70 cm bathtub filled to a depth of 40 cm holds about 420 l . Express that amount in kilolitres.

4. At your present rate per day of drinking milk, how many days will it take you to drink 1 kl of milk?

EXPLORE

MASS

milligram (mg) one thousandth of a gram

$$1 \text{ mg} = 0.001 \text{ g}$$

The milligram is used to measure the mass of vitamins and minerals in cereal, drugs in medicine.

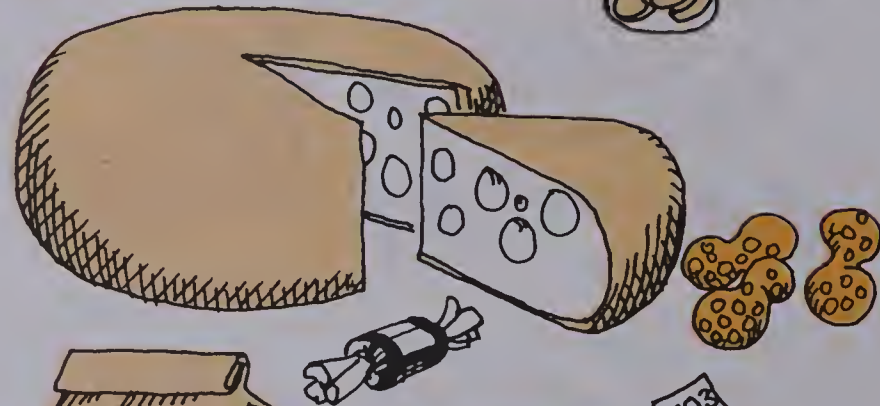


gram (g) one thousandth of a kilogram

$$1 \text{ g} = 0.001 \text{ kg}$$

$$1 \text{ g} = 1000 \text{ mg}$$

The gram is used to measure the mass of butter, cheese, candy, nuts, small quantities of meat.



kilogram (kg) one thousand grams

$$1 \text{ kg} = 1000 \text{ g}$$

The kilogram is used to measure the mass of fruit, flour, sugar, fertilizer.

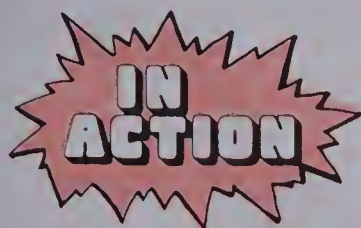


tonne (t) one thousand kilograms

$$1 \text{ t} = 1000 \text{ kg}$$

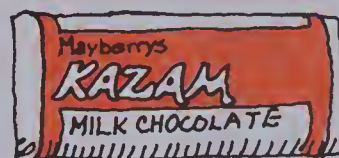
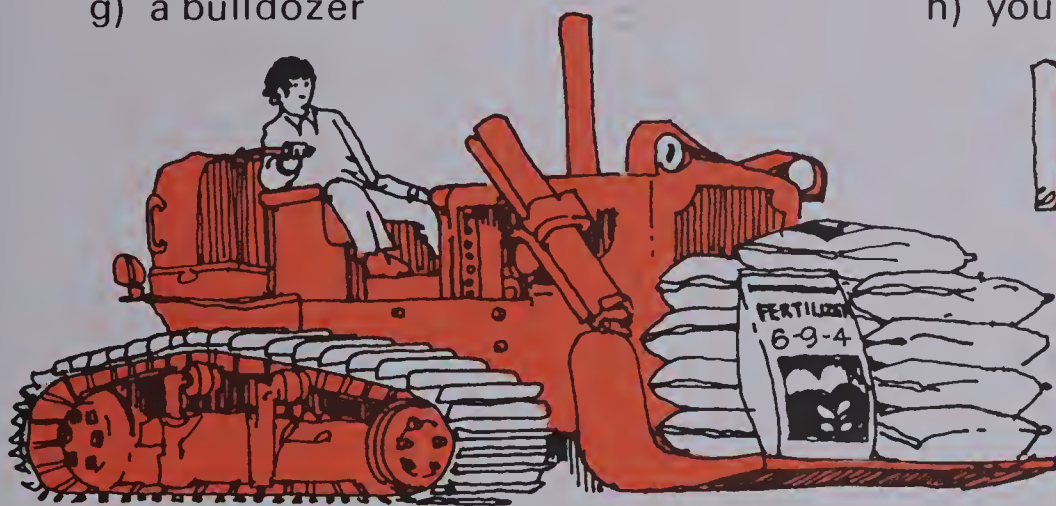
The tonne is used to measure the mass of large quantities of grain, earth, bricks, steel.





1. What unit (milligram, gram, kilogram, tonne) would you use to measure the mass of each of these?

- a) the amount of iron in a pill
- b) fertilizer for a potato farm
- c) baggage on an international flight
- d) yarn for knitting a sweater
- e) a chocolate bar
- f) riboflavin (vitamin B₂) in cereal
- g) a bulldozer
- h) yourself



2. Complete.

- a) 3 g = ? mg
- b) 8.2 kg = ? g
- c) 21.2 mg = ? g
- d) 0.5 t = ? kg
- e) 18 g = ? kg
- f) 5.1 g = ? mg
- g) 0.5 kg = ? g
- h) 170 kg = ? t
- i) 3.5 mg = ? g
- j) 700 g = ? kg
- k) 7 t = ? kg
- l) 3.8 g = ? mg

3. A well-known cereal contains the nutrients described. If the box contains 500 g of cereal, what is the total mass of each vitamin and mineral in the box?

Vitamins and Minerals	
Per 100 g	
Niacin	21.2 mg
Riboflavin	3.5 mg
Thiamine	2.1 mg
Iron	14.2 mg

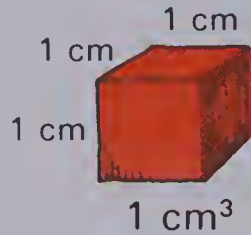
4. This tablet contains 500 mg of vitamin C. If you took 1 each day, how many grams of vitamin C would you take in 1 a?



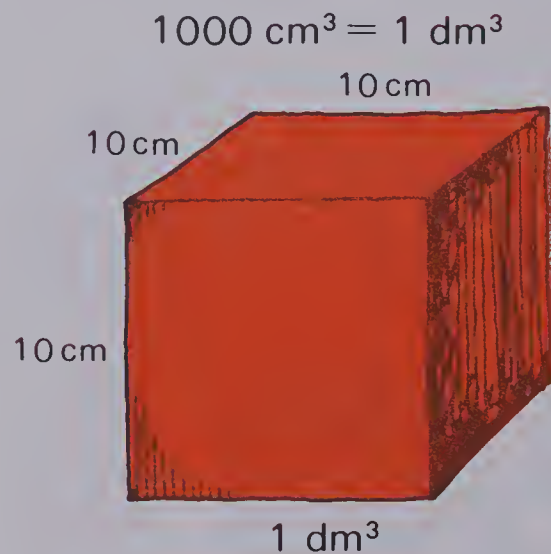
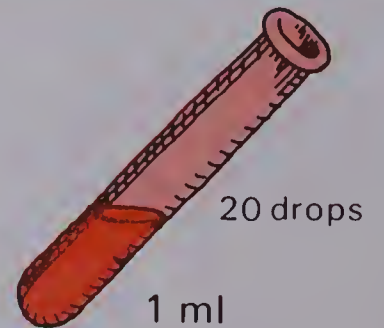
vitamin C

EXPLORE

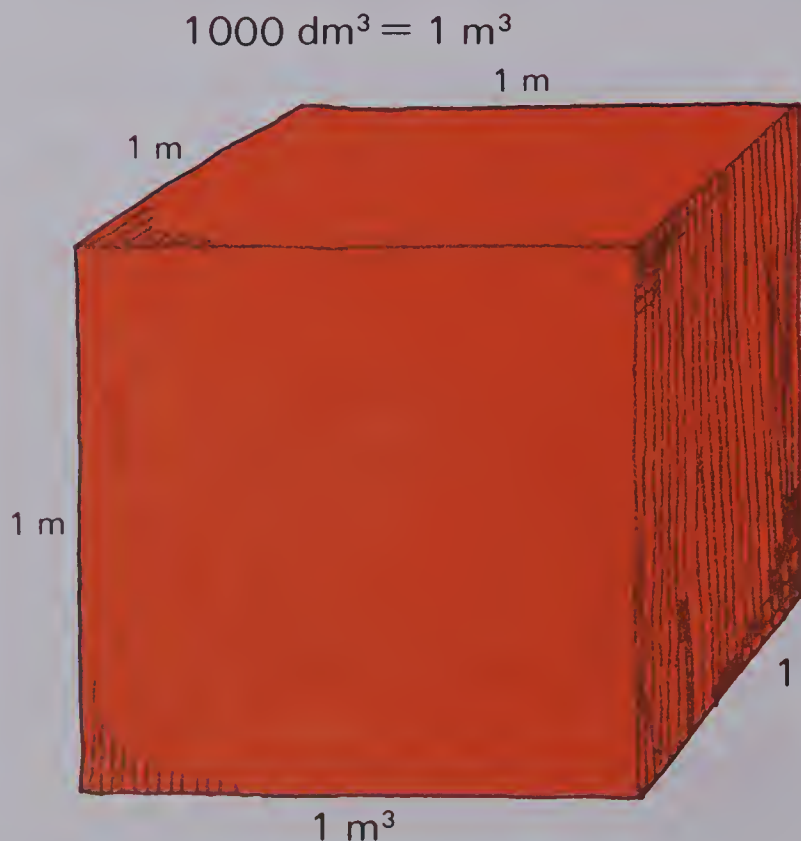
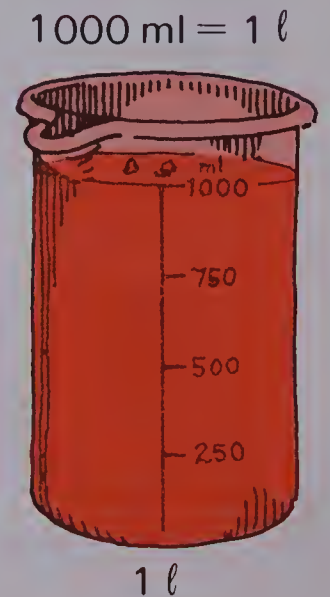
RELATIONSHIPS/Mass, Volume, Capacity



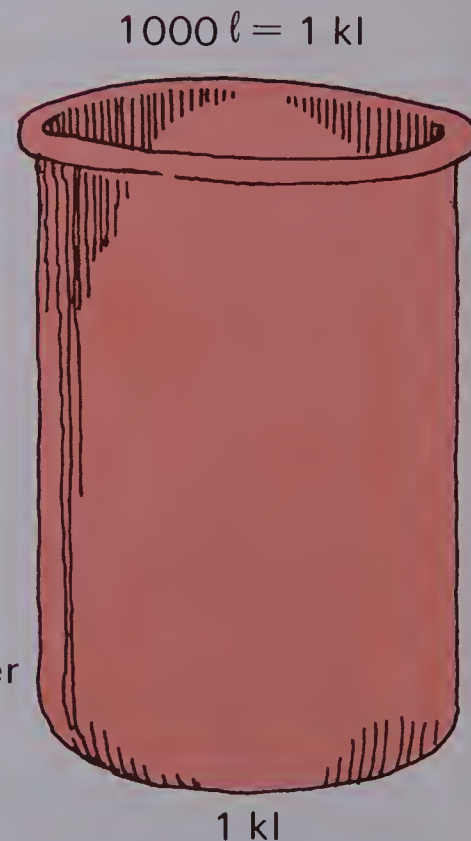
1 cm^3 of water = 1 ml of water
each has
a mass of
1 g



1 dm^3 of water = 1 l of water
each has
a mass of
1 kg



1 m^3 of water = 1 kl of water
each has
a mass of
1 t





Balanced Diet

This table lists the nutrient value for some common foods.

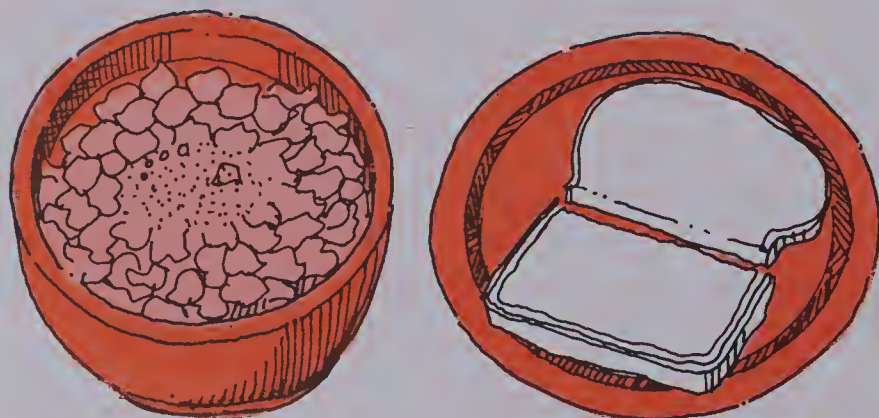
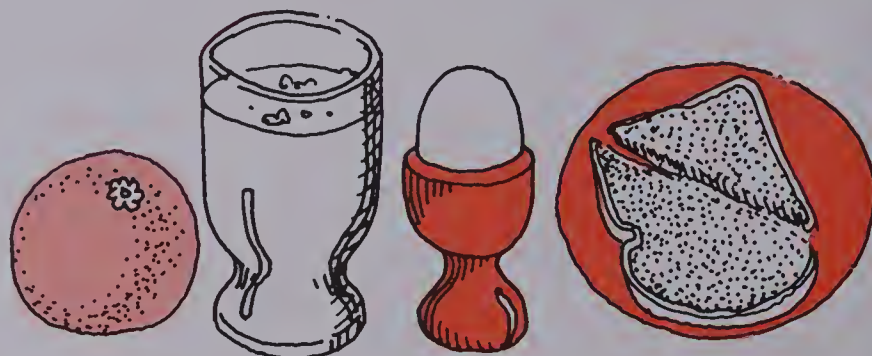
	Amount	Food	Vitamin C mg	Thiamine (Vitamin B ₁) mg	Riboflavin (Vitamin B ₂) mg	Niacin (Vitamin B ₃) mg	Protein g	Calcium mg	Iron mg
milk products	30 g	cheese	0	0	0.13	0	8	211	0.3
	250 ml	ice cream	1	0.05	0.28	0.1	6	194	0.1
	250 ml	milk	2	0.07	0.41	0.2	9	288	0.1
	25 ml	butter	0	0	0	0	0	3	0
eggs	1 medium	egg	0	0.05	0.15	0	6	27	1.1
meat	85 g	beef, roast	0	0.05	0.13	3.1	34	8	2.2
	85 g	beef, steak	0	0.05	0.16	4.0	27	9	2.5
	85 g	ham	0	0.4	0.16	3.1	18	8	2.2
	1	wiener	0	0.08	0.11	1.4	7	3	0.8
	100 g	chicken	0	0.04	0.17	11.2	25	9	1.3
vegetables	125 g	beans, green	15	0.09	0.11	0.6	2	63	0.8
	100 g	carrots	4	0.03	0.03	0.3	1	18	0.4
	1 ear	corn	7	0.09	0.08	1	3	2	0.5
	250 ml	peas, green	33	0.44	0.17	3.7	9	37	2.9
	1 medium	potato	20	0.11	0.04	1.4	2	7	0.6
fruit	1 medium	apple	3	0.04	0.02	0.1	0	8	0.4
	1 medium	orange	66	0.13	0.05	0.5	1	54	0.5
	250 ml	peach, canned	7	0.02	0.06	1.4	1	10	0.8
cereal products	1 slice	bread, white	0	0.07	0.05	0.7	2	20	0.5
	1 slice	bread, brown	0	0.05	0.03	1	3	15	0.07
	20 g	cornflakes	0	0	0.02	0.3	2	1	0.2
	1	cookie, oatmeal	0	0	0	0	1	0	0
	1	doughnut	0	0.05	0.05	0.4	1	13	0.4
	1 serving	pie, apple	2	0.03	0.03	0.6	3	1	0.5
	14 cm								
	1 serving	pizza, cheese	4	0.04	0.12	0.7	7	107	0.7
miscellaneous	1	roll, hot dog	0	0.12	0.08	1.2	5	33	0.8
	35 g	milk chocolate bar	0	0.02	0.06	2	3	31	0.9
	280 ml	cola	0	0	0	0	0	0	0
	15 g	peanut butter	0	0.02	0.02	2.4	4	9	0.3

IN ACTION

To maintain good health, your body has certain requirements. Here are some of the daily basic nutrient needs for people 12 years old.

Vitamin C	30 mg
Thiamine	1.2 mg
Riboflavin	1.5 mg
Niacin	8 mg
Protein	40 g
Calcium	1 g
Iron	11 mg

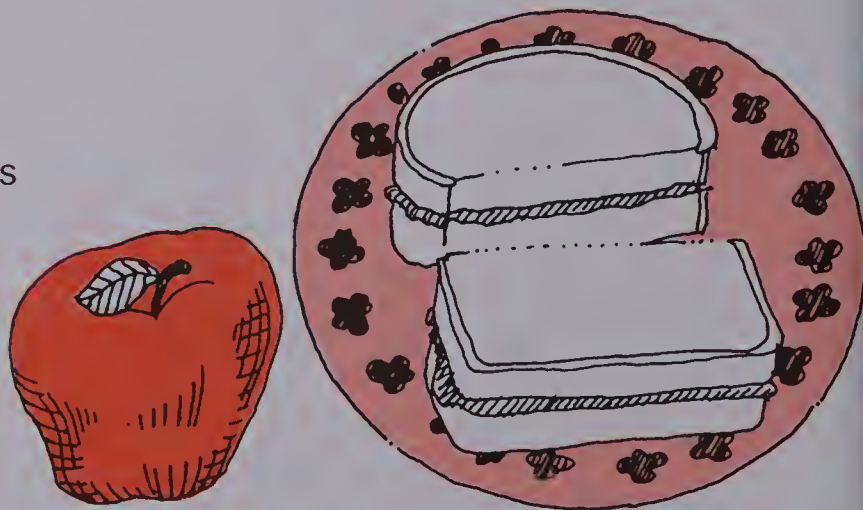
- For breakfast, Jamie ate the following:
1 orange, 1 boiled egg, 1 piece of brown toast, and 1 glass of milk (250 ml).
Find what mass of each of the basic nutrients he obtained.



- Janice ate a bowl of cornflakes, 1 piece of white toast and, including the milk on her cornflakes, she had 500 ml of milk.
Find what mass of each of the basic nutrients she obtained.

- For lunch, both Jamie and Janice ate a peanut butter sandwich and an apple.
Find what mass of each of the basic nutrients was contained in the food.

- After lunch and breakfast, how much more of each of the basic nutrients does each child need to reach the level of the daily requirement?





5. For lunch, Sean had a hot dog and a cola. Colin ate a piece of pizza and a cola.
 - a) Which lunch had more of each of the basic nutrients?
 - b) How do the masses of basic nutrients in a hot dog compare with those in a peanut butter sandwich?



6. Dinner for Janice and Jamie was a serving of ham, green beans, and potato, with ice cream for dessert, and milk. Do the children obtain enough of each of the basic nutrients for that day? (See Questions 1 to 4.)
7. Use the chart on page 59 to plan a menu for a day that meets the minimum daily requirements for good nutrition.
8. Use the chart to assess as closely as you can the nutrient values of the food you ate yesterday.
9. "An apple a day keeps the doctor away" is a slogan often heard. Compare the nutrients of an orange and an apple. Based on your findings, how might you rewrite the statement?

EXPLORE

EQUATIONS

A mathematical sentence that has an "equals" symbol ($=$) is called an **equation**.

$$n - 4 = 16$$

Think
A number subtract 4 is 16.

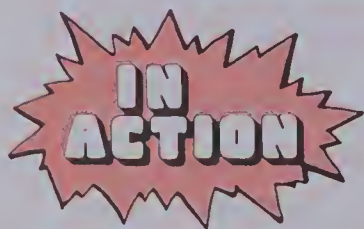
Finding the number represented by the letter symbol in the equation is called **solving the equation**.

Solve. $n - 4 = 16$
 $n = 20$

Think
 $20 - 4 = 16$
The number is 20.

Solve.

$n + 9 = 28$ $n = 19$	<i>Think</i> $19 + 9 = 28$	$k - 7 = 26$ $k = 33$	<i>Think</i> $33 - 7 = 26$
$5 \times y = 40$ $y = 8$	<i>Think</i> $5 \times 8 = 40$	$p \div 6 = 9$ $p = 54$	<i>Think</i> $54 \div 6 = 9$



1. Write the meaning and solve.

a) $n + 4 = 23$

b) $p - 7 = 8$

c) $4 \times k = 36$

d) $y \div 5 = 7$

e) $7 \times q = 56$

f) $d \div 9 = 9$

g) $p - 12 = 0$

h) $k + 11 = 11$

2. Solve.

a) $n - 8 = 7$

b) $p - 8 = 27$

c) $m \div 10 = 10$

d) $10 \times k = 120$

e) $d + 14 = 23$

f) $m + 16 = 31$

g) $7 \times l = 63$

h) $r \div 10 = 1$

i) $p \div 10 = 10$

j) $k \div 10 = 0.1$

k) $m \div 10 = 0.01$

l) $f \div 10 = 100$



Equations with 2 Operations

Solve.

$$(7 \times n) - 8 = 55$$

$$n = 9$$

Think

A number subtract 8 is 55.

$$63 - 8 = 55$$

$$\text{so } 7 \times n = 63$$

$$7 \times 9 = 63$$

Solve.

$$(k \div 6) + 13 = 20$$

$$k = 42$$

Think

A number add 13 is 20.

$$7 + 13 = 20$$

$$\text{so } k \div 6 = 7$$

$$42 \div 6 = 7$$

**IN
ACTION**

1. Complete.

a) $(4 \times p) - 12 = 16$

$$p = ?$$

Think

A number subtract 12 is ?

$$? - 12 = 16$$

$$4 \times p = ?$$

$$4 \times ? = 28$$

b) $(k \div 10) - 5 = 15$

$$k = ?$$

Think

A number subtract 5 is 15.

$$20 - 5 = 15$$

$$k \div 10 = 20$$

$$? \div 10 = 20$$

2. Solve.

a) $(2 \times p) + 4 = 18$

b) $(n \div 4) - 3 = 7$

c) $(m \div 5) + 3 = 8$

d) $(k \div 8) - 2 = 7$

e) $(3 \times n) - 6 = 30$

f) $(7 \times p) - 9 = 40$

g) $(m \div 6) - 8 = 40$

h) $(p \div 9) - 1 = 0$

3. Write the equation and solve it.

a) a number divided by 4 is 15

c) a number subtract 11 is 6

e) 5 times a number, subtract 8, is 27

g) 9 times a number, subtract 5, is 49

b) 9 times a number is 72

d) a number add 17 is 35

f) 7 times a number, add 4, is 25

h) a number divided by 8, add 3, is 10

EXPLORE

INEQUATIONS

A mathematical sentence that has an "is greater than" symbol ($>$) or an "is less than" symbol ($<$) is called an **inequation**.

All of the letter symbols used here represent whole numbers.

$$n - 4 < 1$$

Think

$$5 - 4 = 1$$

$$4 - 4 < 1$$

$$3 - 4 < 1$$

$$2 - 4 < 1$$

$$1 - 4 < 1$$

$$0 - 4 < 1$$

$$n = 0, 1, 2, 3, \text{ or } 4$$

$\{0, 1, 2, 3, 4\}$ is called the **solution set**.



is the **graph** of the solution set.

Solve. $n - 4 > 1$

Think

$$5 - 4 = 1$$

$$6 - 4 > 1$$

$$7 - 4 > 1$$

$$8 - 4 > 1$$

$$9 - 4 > 1$$

and so on

$$n = 6, 7, 8, 9, \dots$$

$\{6, 7, 8, 9, \dots\}$ is the solution set

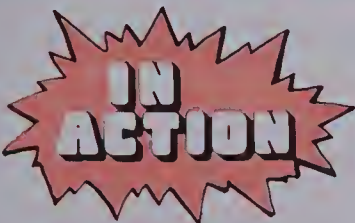
The set contains all the whole numbers greater than 5.

This is shown by the 3 dots (ellipsis) in the set.

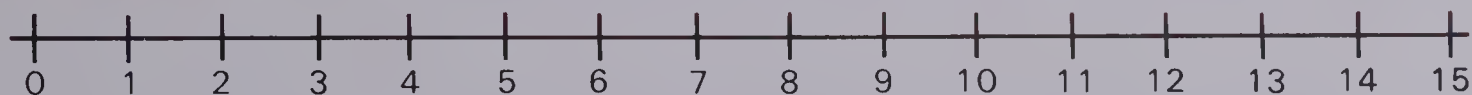


is the graph of the solution set.

The arrow indicates that the graph continues.



1. Refer to the number line.



- a) If $k = 5$,

what are the whole numbers less than k ? greater than k ?

Where are the whole numbers less than k and greater than k shown on the number line?

- b) If $p = 8$,

what are the whole numbers less than p ? greater than p ?

Where are the whole numbers less than p and greater than p shown on the number line?

2. If $n = \{4, 5, 6, 7, 8, 9, 10\}$, solve the inequations.

Write the solution set,

and draw a graph of each solution set.

- a) $n - 3 < 7$ b) $n + 3 > 8$ c) $n + 3 > 5$

Remember for each solution the only values

n can have must be in the set

$\{4, 5, 6, 7, 8, 9, 10\}$.

3. Solve. Write the solution set. Draw a graph.

- a) $n - 2 < 6$ b) $n - 3 < 4$ c) $n - 1 < 1$ d) $n - 1 < 0$

4. For $k = \{0, 1, 2, 3, \dots, 15\}$, solve the inequations.

Write the solution set. Draw the graph.

- a) $k - 2 > 3$ b) $k + 4 > 9$ c) $k + 12 > 15$ d) $k + 15 > 15$

5. Solve, if $n = \{0, 2, 4, 6, 8, 10\}$.

Write the solution set. Draw the graph.

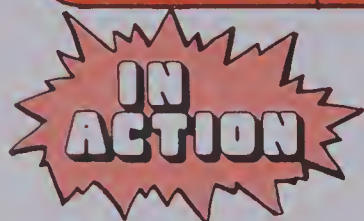
- a) $2 \times n < 8$ b) $4 \times n > 8$ c) $3 \times n > 10$ d) $1 \times n < 6$

EXPLORE

LETTER SYMBOLS IN EXPRESSIONS

Complete.

p	$2 \times p$	$(2 \times p) - 1$	$(2 \times p) + 1$	$4 \times p$	$(4 \times p) + 3$
1	2	1	3	4	7
2	4	3	5		
3					
4					
5					
	12				
		13	15		



1. If $k = 7$, find

- a) $2 \times k$ b) $3 \times k$ c) $k \times k$
 d) $k + k$ e) $k - k$ f) $k - 1$

2. If $a = 5$ and $b = 6$, find

- a) $a + b$ b) $b - a$ c) $a \times b$
 d) $a \times a$ e) $b \times b$ f) $(a \times a) + (b \times b)$

3. Complete.

a	b	$a + b$	$a - b$	$(2 \times a) + (2 \times b)$	$a \times a$	$b \times b$	$(a \times a) + (b \times b)$
3	2						
4	1						
5	2						
7	3						
8	4						

4. Complete each chart.

a)

Given x	Find y
x	$y = x + 3$
2	$2 + 3 = 5$
4	
7	
6	
9	

b)

Given x	Find y
x	$y = x - 4$
4	
6	
9	
8	
12	

c)

Given x	Find y
x	$y = (2 \times x) + 1$
0	
3	
4	
5	
6	



Retrace Your Steps

1. Express in grams.

- a) 3 kg b) 2000 mg c) 8.5 kg d) 800 mg e) 400 mg f) 25.5 kg g) 0.08 kg
h) 1500 mg i) 5 kg j) 80 mg k) 9.1 kg l) 0.55 kg m) 5 mg n) 95.4 kg

2. Express in kilograms.

- a) 18 000 g b) 1700 g c) 2 t d) 950 g e) 1.35 t f) 85 g g) 50 g

3. Express in litres.

- a) 6000 ml b) 1 kl c) 500 ml d) 0.5 kl e) 650 ml f) 125 ml g) 8 kl
h) 150 ml i) 0.35 kl j) 75 ml k) 8 ml l) 0.05 kl m) 100 kl n) 25 ml

4. Express in millilitres.

- a) 6 ℓ b) 9 ℓ c) 25 ℓ d) 40 ℓ e) 7.5 ℓ f) 12.9 ℓ g) 0.5 ℓ

5. If 1000 sheets of paper have a mass of 4 kg, what is the mass of 1 sheet?

6. 1 ℓ of water has a mass of 1000 g.
How many litres of water does a tank hold if the total mass is 6585 g and the tank has a mass of 950 g?

7. Solve.

- | | | | |
|-----------------------|-------------------|------------------------|-----------------------|
| a) $g + 9 = 13$ | b) $p - 6 = 4$ | c) $3 \times k = 36$ | d) $r \div 5 = 4$ |
| e) $h \times 18 = 54$ | f) $c \div 8 = 7$ | g) $8 + n = 33$ | h) $q - 13 = 20$ |
| i) $e + 7 = 60$ | j) $29 - j = 25$ | k) $u \div 10 = 70$ | l) $d \times 20 = 10$ |
| m) $9 + c = 15$ | n) $f - 14 = 36$ | o) $n \times 15 = 105$ | p) $a \div 4 = 25$ |

8. Solve.

- | | | |
|---------------------------|---------------------------|-----------------------|
| a) $6 + a + 8 = 23$ | b) $9 + 10 + e = 24$ | c) $r + 10 + 6 = 20$ |
| d) $2 \times c + 3 = 13$ | e) $3 \times n + 4 = 10$ | f) $r \div 3 + 4 = 6$ |
| g) $m \div 3 - 2 = 2$ | h) $q \times 6 - 10 = 20$ | i) $r + 20 + 5 = 30$ |
| j) $g \times 5 - 10 = 50$ | k) $17 \times n + 9 = 60$ | l) $f \div 8 + 5 = 8$ |



Cross-Number Puzzle

ACROSS

- 2. $1000 \times 10 + 4562$
- 6. $85 - 19$
- 8. 12×12
- 9. 21×21
- 11. 51×1
- 12. $2 \times 12 \times 10$
- 13. $256 + 425 - 193$
- 14. $80 \div 2 + 1$
- 15. 10^2
- 16. 5×12
- 17. $2 \times 2 \times 2 \times 2$
- 19. $21 \times 20 + 8$
- 22. 13×13
- 24. $6 \times 2 + 2$
- 26. 8×9
- 28. $(9 \times 10 + 1) \times 10 + 1$
- 31. $7 \times 9 + 18$
- 33. 15×15
- 35. 313×3
- 36. 7×5
- 37. $40 \times 20 + 20$
- 38. $500 + 400 + 10 + 16$
- 39. $5 \times 12 - 5$
- 40. $46\,825 + 9368$

1				2	3		4	5	
6	7		8				9		10
11			12				13		
14			15					16	
	17	18			19		20		
21		22		23			24	25	
26	27			28	29	30		31	32
33		34		35				36	
37				38				39	
	40								

Make a copy of this cross-number puzzle in your workbook.

DOWN

- | | | |
|------------------------------------|-------------------------------|--------------------------|
| 1. $8743 - 2089$ | 8. 11×11 | 25. $987 \times 5 - 100$ |
| 2. 120×12 | 10. 600×3 | 27. $1111 \times 2 + 3$ |
| 3. $88\,008 \div 2$ | 18. 61×1 | 29. $3969 \div 3$ |
| 4. $644 \div 1$ | 20. 9×9 | 30. 14×14 |
| 5. $11 \times 11 \times 11 + 1155$ | 21. $12 \times 12 \times 12$ | 32. $1500 + 50 + 9$ |
| 7. $3422 + 2689$ | 23. $9 \times 1000 + 90\,999$ | 34. $10 \times 50 + 6$ |

EXPLORE

PROBLEM SOLVING/Creating Word Problems



We can look at a picture and create a word problem.

Consider the scores for the game. You may ask this problem.

Home score is 54. Visitors' score is 36.

How many points does the visiting team
need to tie the score?

Consider a score for the visiting team
that would allow them to win the game.

Create a problem about that score.

A game lasts 20 min. Create a problem.

If 1 min 36 s remain of a . . .

Try to create some other word problems
for this picture. You may wish to consider
ratio, distance, or some other mathematical topic.

IN ACTION

1. Create at least 1 word problem for each picture.

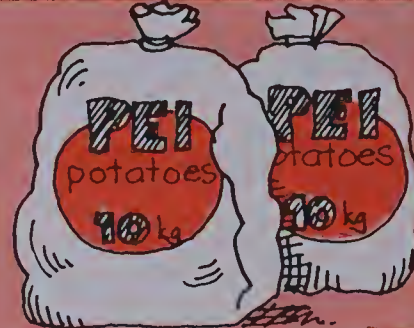
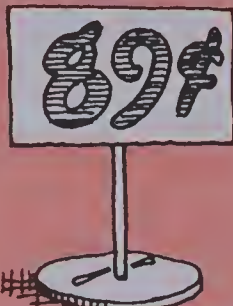
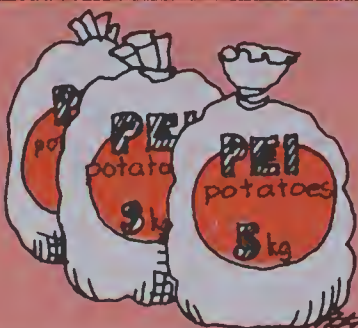
a)



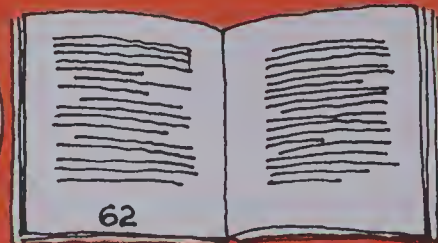
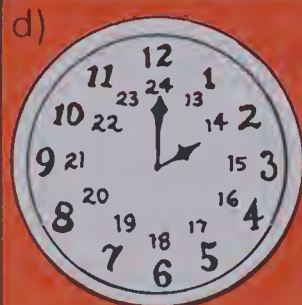
b)



c)



d)



e)

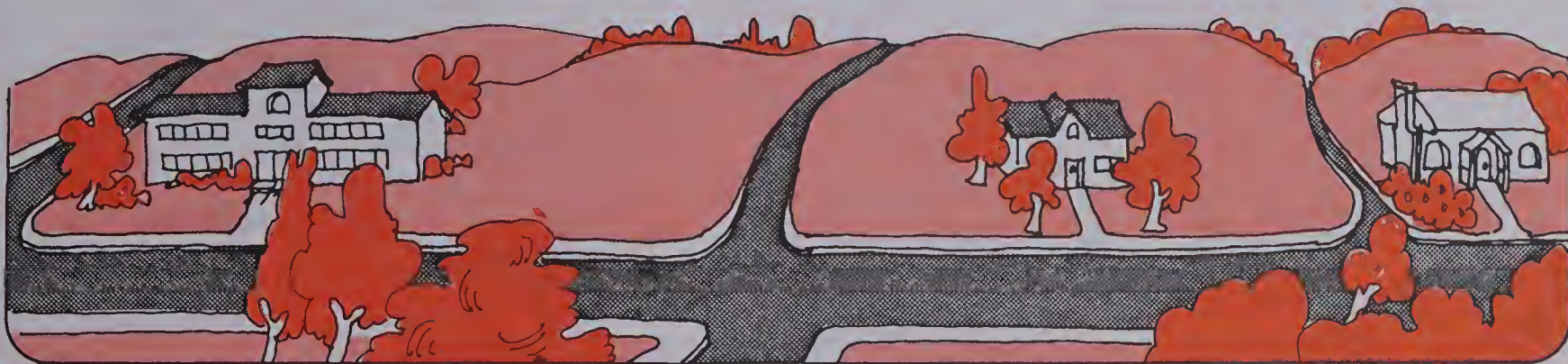




Problem Solving

Consider a picture.

The picture may not have all the facts for a word problem.
Complete the picture to create a problem. Solve it.



To do this, it may help to ask some questions about the picture in order to decide on the data to be used.

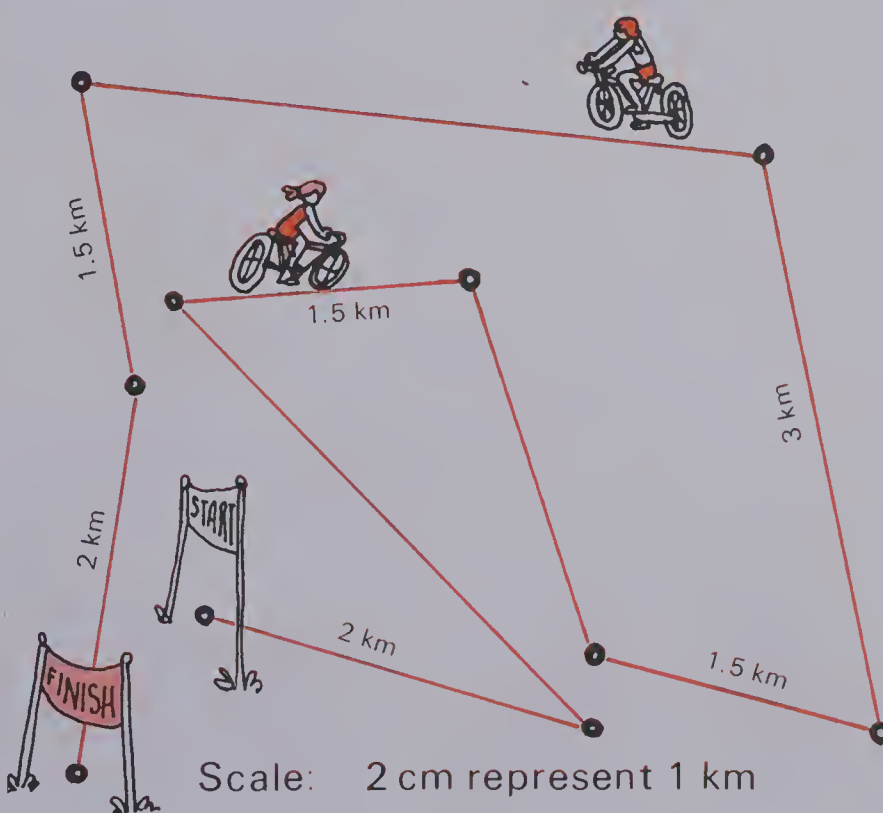
How far is it between the school and the first house?

Does a student live in the first house?
Does the student eat lunch at home?

Try to create some other questions about the picture.

IN ACTION

1. Add information to this picture. Create at least 5 word problems.
2. Look for some pictures to make word problems. You may want to use your *mathways* book, a reader, or a magazine. Your class may wish to make a scrapbook of newspaper and magazine pictures. Write a word problem for each picture.



Finding Unit Cost



Problem

6 books cost \$9.00
Find the cost of 5 books.

To understand the problem,
think of a simple similar problem

Think

2 books cost \$2.00
1 book costs $$(2.00 \div 2)$
1 book costs \$1.00
5 books cost $$(1.00 \times 5)$
or \$5.00

We first found the unit cost
by dividing. Then we found
the required cost by multiplying.

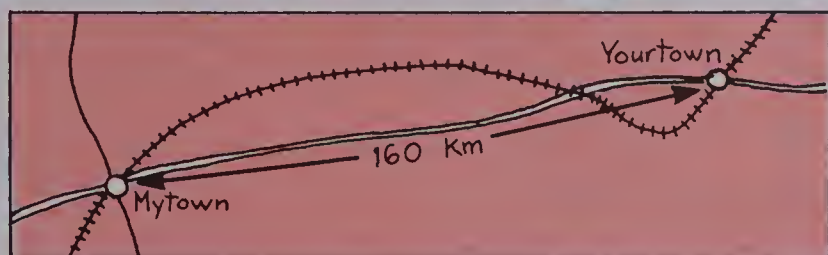
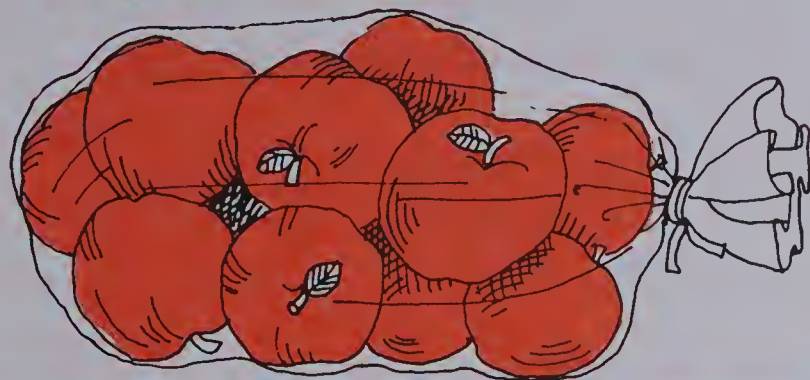
Solution

6 books cost \$9.00
1 book costs $$(9.00 \div 6)$
or \$1.50
5 books cost $$(1.50 \times 5)$
or \$7.50

We can now find the cost of any number of books.

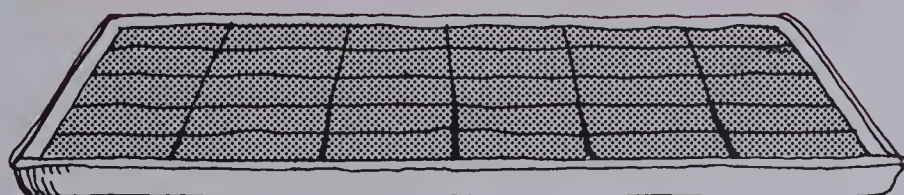


1. If 10 apples cost \$1.30, what is the cost of 1 apple?



2. The cost of the gasoline for a trip from Mytown to Yourtown is \$5.76. What is the cost per kilometre?

3. A Board of Education is given a special unit price of \$2.13 for a package of workbooks. Schools must purchase a minimum of 800 packages. What is the cost of a minimum order?



4. Jacques made a large pan of fudge for the fair at a cost of \$3.90. He divided the fudge into 30 squares. What is the cost for 1 square of fudge?

5. A store bought a special shipment of ski hats for \$450. The shipment contained 100 hats. What is the unit cost?

6. Mr. Swain of the Unified Arts program ordered 20 m of a certain size of white pine boards. The bill was \$20. What is the cost of 1 m of white pine?

7. It cost \$60 to charter a bus to take 40 students to the museum. What does it cost each student to go to the museum?



Unit 1, Check 1

Check your progress. The answers are on page 82.
7, 0, 4, 9

1. a) What is the largest number you can make using these digits?
b) What is the smallest whole number you can make using these digits?
c) What is the difference between these 2 numbers?
d) Using these digits find the 2 numbers that have a difference of 7146.
e) Begin with the 4. What is the largest number you can make?
What is the smallest whole number you can make?

2. Add.
- | | | | | | | |
|-----------|------------|------------|-------------|--------------|---------------|------------|
| a) 23 | b) 3.6 | c) 236 | d) 80.4 | e) 6 324 | f) 16 344 | g) 1.46 |
| 47 | 8.9 | 24 | 10.8 | 2 061 | 7 810 | 3.057 |
| 70 | 7.4 | 196 | 70.0 | 3 783 | 31 067 | 0.493 |
| 81 | 0.9 | 18 | 13.8 | 5 100 | 4 444 | 0.02 |
| <u>19</u> | <u>2.0</u> | <u>733</u> | <u>38.0</u> | <u>1 605</u> | <u>13 769</u> | <u>6.1</u> |

3. Find the total amount.
- | | | |
|-------------|-------------|---------------------------------------|
| a) \$1.46 | b) \$16.50 | c) \$6.43, \$19.98, \$0.49, \$4.52 |
| 3.58 | 8.41 | d) \$0.36, \$0.98, \$0.13, \$0.58 |
| 7.04 | 30.06 | e) \$13.00, \$19.00, \$0.51, \$133.24 |
| <u>0.71</u> | <u>4.84</u> | |

4. Subtract.
- | | | | | | |
|-----------|------------|-------------|-------------|--------------|-------------|
| a) 136 | b) 438 | c) 14.06 | d) 6300 | e) 714.6 | f) 5490 |
| <u>25</u> | <u>335</u> | <u>8.89</u> | <u>4635</u> | <u>292.7</u> | <u>3083</u> |

5. Find the difference in amount.
- | | | | | | |
|-------------|-------------|-------------|-------------|--------------|--------------|
| a) \$7643 | b) \$6408 | c) \$8040 | d) \$4.36 | e) \$81.46 | f) \$198.76 |
| <u>2074</u> | <u>1907</u> | <u>6293</u> | <u>3.92</u> | <u>39.05</u> | <u>99.00</u> |

6. Complete the chart.

	Power form	Factor form	Number of times factor is used	Standard numeral
a)		$4 \times 4 \times 4 \times 4$		
b)	7^3			
c)	$2^?$			32
d)		$5 \times 5 \times 5 \times 5 \times 5$		
e)	10^6			

Unit 1, Practice 1

1. Write the numeral.

- a) $600 + 30 + 7 + 0.1$ b) $1000 + 700 + 90 + 2 + 0.8$
 c) $80 + 5 + 0.4 + 0.03$ d) $900 + 3 + 0.7 + 0.04 + 0.001$
 e) $30\,000 + 5\,000 + 60 + 0.3$ f) $20\,000 + 0.9 + 0.009$

2. Add.

- | | | | | | | |
|----------|-----------|-----------|-----------|------------|--------------|--------------|
| a) 4 | b) 19 | c) 841 | d) 53 | e) \$1463 | f) \$13.91 | g) \$314.60 |
| 3 | 36 | 36 | 491 | 918 | 7.46 | 70.40 |
| 6 | 21 | 29 | 608 | 2543 | 80.30 | 109.38 |
| <u>2</u> | <u>17</u> | <u>54</u> | <u>37</u> | <u>761</u> | <u>15.00</u> | <u>64.59</u> |

- h) $\$1463.52 + \$189.50 + \$200.62$ i) $1.46 + 3.2 + 9.15 + 10.43$
 j) $43.1 + 9.04 + 16.89 + 3.05$ k) $1.043 + 5.397 + 6.520 + 2.009$

3. Subtract.

- | | | | |
|-----------------|------------------|-----------------------|------------------------|
| a) $1356 - 492$ | b) $5640 - 4290$ | c) $18\,305 - 9\,606$ | d) $43\,321 - 33\,249$ |
| e) \$14.36 | f) \$328.46 | g) \$2400 | h) 430.2 |
| <u>9.89</u> | <u>280.91</u> | <u>1799</u> | <u>108.3</u> |
| | | | <u>51.909</u> |
| | | | <u>0.519</u> |

4. Write in power form.

- a) 9×9 b) $3 \times 3 \times 3 \times 3 \times 3$ c) $8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8$
 d) $2 \times 2 \times 2$ e) $5 \times 5 \times 5$

5. Write in factor form.

- a) 7^4 b) 1^9 c) 10^5 d) 2^3 e) $\frac{1}{10^1}$ f) 4^4 g) 8^1 h) $\frac{1}{10^2}$

6. Write the standard numeral.

- a) 8^2 b) 10^4 c) 5^5 d) 9^1 e) $\frac{2}{10^1}$ f) $\frac{5}{10^2}$ g) $\frac{1}{10^3}$

7. Complete.

- a) $5^? = 5 \times 5 \times 5 \times 5$ b) $?^4 = 10\,000$ c) $?^3 = 64$
 d) $\frac{1}{10^?} = 0.01$ e) $\frac{3}{10^?} = 0.003$ f) $\frac{2}{?^2} = 0.02$

8. What is the number?

- a) $10^3 + 10^2 + 10^1 + \frac{3}{10^1}$ b) $9 + \frac{1}{10^1} + \frac{2}{10^2}$
 c) $6(10^2) + 2(10^1) + 5 + \frac{5}{10^1} + \frac{4}{10^2} + \frac{1}{10^3}$

Unit 1, Check 2

1. Complete.

- | | | | |
|--------------------------|---------------------------|-------------------------|--------------------------|
| a) $4 \times 10 = ?$ | b) $9 \times 100 = ?$ | c) $0.5 \times 10 = ?$ | d) $0.3 \times 100 = ?$ |
| e) $10 \div 1 = ?$ | f) $500 \div 5 = ?$ | g) $12 \div 10 = ?$ | h) $356 \div 100 = ?$ |
| i) $1.4 \div 10 = ?$ | j) $3.2 \times 10 = ?$ | k) $7.8 \times 100 = ?$ | l) $56 \div 100 = ?$ |
| m) $81.4 \times 100 = ?$ | n) $3900 \div 100 = ?$ | o) $390 \div 1000 = ?$ | p) $4.07 \times 100 = ?$ |
| q) $0.5 \div 10 = ?$ | r) $0.06 \times 1000 = ?$ | s) $8.8 \div 10 = ?$ | t) $0.09 \times 100 = ?$ |

2. Multiply.

- | | | | | | | | |
|--|--|--|--|--|--|--|--|
| a) $\begin{array}{r} 23 \\ 8 \end{array}$ | b) $\begin{array}{r} 47 \\ 6 \end{array}$ | c) $\begin{array}{r} 81 \\ 9 \end{array}$ | d) $\begin{array}{r} 37 \\ 5 \end{array}$ | e) $\begin{array}{r} 89 \\ 7 \end{array}$ | f) $\begin{array}{r} 42 \\ 4 \end{array}$ | g) $\begin{array}{r} 68 \\ 3 \end{array}$ | h) $\begin{array}{r} 74 \\ 9 \end{array}$ |
| i) $\begin{array}{r} 136 \\ 4 \end{array}$ | j) $\begin{array}{r} 760 \\ 5 \end{array}$ | k) $\begin{array}{r} 438 \\ 7 \end{array}$ | l) $\begin{array}{r} 507 \\ 8 \end{array}$ | m) $\begin{array}{r} 921 \\ 6 \end{array}$ | n) $\begin{array}{r} 826 \\ 2 \end{array}$ | o) $\begin{array}{r} 630 \\ 4 \end{array}$ | p) $\begin{array}{r} 370 \\ 3 \end{array}$ |

3. Find the product.

- | | | | | |
|--------------------|--------------------|----------------------|----------------------|----------------------|
| a) 4.3×5 | b) 7.6×7 | c) 24×0.5 | d) 81×0.3 | e) 23.1×6 |
| f) 78.4×9 | g) 2.36×2 | h) 14.7×0.3 | i) 63.8×0.5 | j) 9.34×0.8 |

4. Multiply.

- | | | | | | | | |
|--|--|--|--|---|---|---|---|
| a) $\begin{array}{r} 24 \\ 16 \end{array}$ | b) $\begin{array}{r} 36 \\ 19 \end{array}$ | c) $\begin{array}{r} 76 \\ 21 \end{array}$ | d) $\begin{array}{r} 83 \\ 34 \end{array}$ | e) $\begin{array}{r} 58 \\ 42 \end{array}$ | f) $\begin{array}{r} 91 \\ 31 \end{array}$ | g) $\begin{array}{r} 80 \\ 25 \end{array}$ | h) $\begin{array}{r} 66 \\ 20 \end{array}$ |
| i) $\begin{array}{r} 62 \\ 1.5 \end{array}$ | j) $\begin{array}{r} 3.7 \\ 28 \end{array}$ | k) $\begin{array}{r} 94 \\ 7.7 \end{array}$ | l) $\begin{array}{r} 7.8 \\ 68 \end{array}$ | m) $\begin{array}{r} 8.4 \\ 3.9 \end{array}$ | n) $\begin{array}{r} 6.1 \\ 5.9 \end{array}$ | o) $\begin{array}{r} 9.8 \\ 56 \end{array}$ | p) $\begin{array}{r} 7.2 \\ 5.6 \end{array}$ |
| q) $\begin{array}{r} 0.45 \\ 21 \end{array}$ | r) $\begin{array}{r} 0.84 \\ 49 \end{array}$ | s) $\begin{array}{r} 74 \\ 0.38 \end{array}$ | t) $\begin{array}{r} 56 \\ 0.41 \end{array}$ | u) $\begin{array}{r} 8.4 \\ 0.12 \end{array}$ | v) $\begin{array}{r} 6.3 \\ 0.35 \end{array}$ | w) $\begin{array}{r} 0.64 \\ 1.2 \end{array}$ | x) $\begin{array}{r} 0.98 \\ 2.3 \end{array}$ |

5. 38 students in a sewing class choose to make a shirt. The pattern requires 0.9 m of cloth. How many metres of cloth are required by the 38 students?

6. The width of 1 parking space is 2.65 m. If there are 30 parking spaces in a row, what is the length of the row?



Unit 1, Practice 2

1. Complete.

- | | | | |
|--------------------------|---------------------------|---------------------------|-------------------------|
| a) $1.4 \times 10 = ?$ | b) $? \times 10 = 26$ | c) $5.9 \times 100 = ?$ | d) $? \times 100 = 510$ |
| e) $24 \div 10 = ?$ | f) $? \div 10 = 7.8$ | g) $337 \div 100 = ?$ | h) $? \div 100 = 4.17$ |
| i) $? \times 10 = 1.4$ | j) $35 \times ? = 350$ | k) $1476 \div 1000 = ?$ | l) $2.5 \times 100 = ?$ |
| m) $0.5 \times 1000 = ?$ | n) $? \div 10 = 0.4$ | o) $0.09 \times 1000 = ?$ | p) $? \div 100 = 7.6$ |
| q) $? \div 1000 = 0.1$ | r) $0.04 \times 1000 = ?$ | s) $? \times 1000 = 4000$ | t) $8.5 \times 100 = ?$ |

2. Find the products.

- | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| a) 300×8 | b) 420×5 | c) 950×2 | d) 500×4 | e) 730×6 |
| f) 431×2 | g) 827×4 | h) 952×3 | i) 287×7 | j) 438×9 |

3. Multiply.

- | | | | | | | | |
|--|--|--|--|--|--|--|--|
| a) $\begin{array}{r} 42 \\ 18 \end{array}$ | b) $\begin{array}{r} 84 \\ 26 \end{array}$ | c) $\begin{array}{r} 91 \\ 37 \end{array}$ | d) $\begin{array}{r} 56 \\ 29 \end{array}$ | e) $\begin{array}{r} 78 \\ 42 \end{array}$ | f) $\begin{array}{r} 96 \\ 38 \end{array}$ | g) $\begin{array}{r} 86 \\ 71 \end{array}$ | h) $\begin{array}{r} 66 \\ 44 \end{array}$ |
| i) $\begin{array}{r} 34 \\ 20 \end{array}$ | j) $\begin{array}{r} 50 \\ 25 \end{array}$ | k) $\begin{array}{r} 91 \\ 37 \end{array}$ | l) $\begin{array}{r} 68 \\ 56 \end{array}$ | m) $\begin{array}{r} 71 \\ 47 \end{array}$ | n) $\begin{array}{r} 82 \\ 61 \end{array}$ | o) $\begin{array}{r} 90 \\ 47 \end{array}$ | p) $\begin{array}{r} 79 \\ 50 \end{array}$ |

4. Find the products.

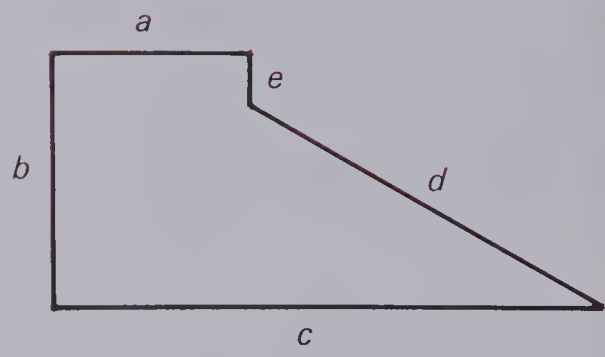
- | | | | | |
|--------------------|---------------------|--------------------|---------------------|---------------------|
| a) 4.2×3 | b) 8.9×5 | c) 7.7×8 | d) 65×0.4 | e) 93×0.7 |
| f) 13.4×2 | g) 256×0.5 | h) 1.17×6 | i) 421×0.8 | j) 781×0.4 |

5. Multiply.

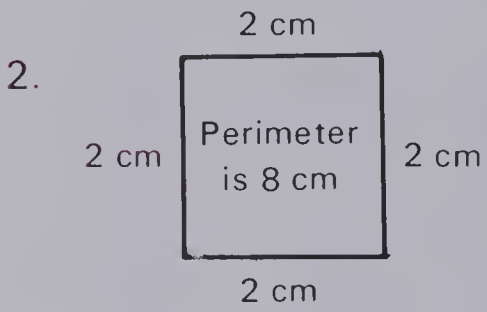
- | | | | | | | | |
|--|--|---|---|--|--|---|--|
| a) $\begin{array}{r} 2.4 \\ 12 \end{array}$ | b) $\begin{array}{r} 6.8 \\ 19 \end{array}$ | c) $\begin{array}{r} 85 \\ 2.3 \end{array}$ | d) $\begin{array}{r} 94 \\ 3.2 \end{array}$ | e) $\begin{array}{r} 8.5 \\ 39 \end{array}$ | f) $\begin{array}{r} 64 \\ 4.2 \end{array}$ | g) $\begin{array}{r} 5.8 \\ 25 \end{array}$ | h) $\begin{array}{r} 74 \\ 4.1 \end{array}$ |
| i) $\begin{array}{r} 7.2 \\ 1.3 \end{array}$ | j) $\begin{array}{r} 87 \\ 0.15 \end{array}$ | k) $\begin{array}{r} 56 \\ 0.34 \end{array}$ | l) $\begin{array}{r} 0.92 \\ 36 \end{array}$ | m) $\begin{array}{r} 0.63 \\ 46 \end{array}$ | n) $\begin{array}{r} 48 \\ 3.3 \end{array}$ | o) $\begin{array}{r} 7.8 \\ 52 \end{array}$ | p) $\begin{array}{r} 96 \\ 3.8 \end{array}$ |
| q) $\begin{array}{r} 4.4 \\ 3.9 \end{array}$ | r) $\begin{array}{r} 8.6 \\ 5.3 \end{array}$ | s) $\begin{array}{r} 0.42 \\ 2.8 \end{array}$ | t) $\begin{array}{r} 7.6 \\ 0.49 \end{array}$ | u) $\begin{array}{r} 6.8 \\ 4.3 \end{array}$ | v) $\begin{array}{r} 68.4 \\ 0.35 \end{array}$ | w) $\begin{array}{r} 0.65 \\ 5.6 \end{array}$ | x) $\begin{array}{r} 9.9 \\ 9.9 \end{array}$ |

Unit 1, Check 3

1. Measure and record the length in centimetres of each side of the figure. Complete the chart.

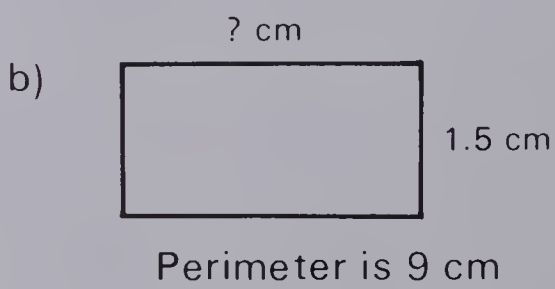
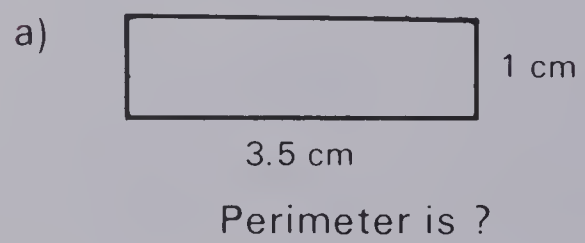


Side	Length in:			
	centimetres (cm)	decimetres (dm)	millimetres (mm)	metres (m)
a				
b				
c				
d				
e				



Draw a rectangle with the same perimeter as the square and the length of 1 side 1 cm. What is the length of the second side?

3. Complete.



4. There are 8 apartments on a floor. If 2 people live in each apartment, how many people live on that floor?

6. The letter carrier delivered 40 letters on Monday, 32 letters on Tuesday, and 53 letters on Wednesday. How many letters did he deliver in the 3 d?
5. Each apartment has 4 windows. How many windows must the window cleaner wash for the 8 apartments?

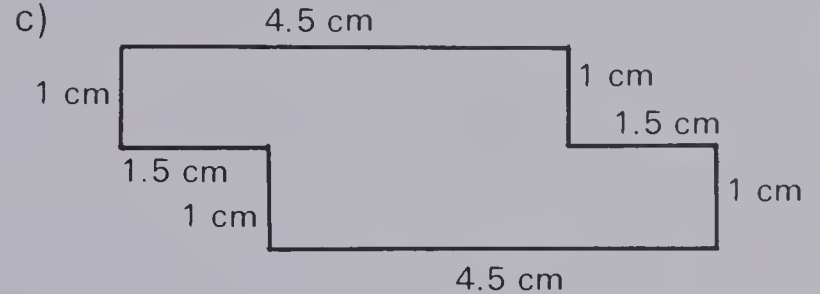
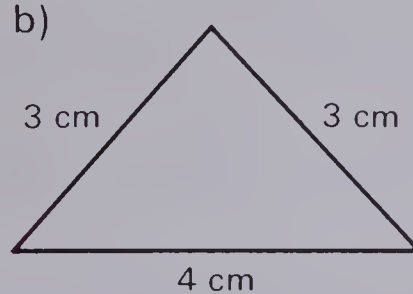
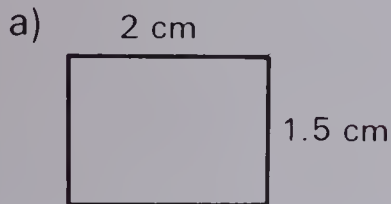
7. The following numbers of people used the elevator on Monday morning:
07:00-07:30 11 people; 07:31-08:00 28 people;
08:01-08:30 38 people; 08:31-09:00 16 people.
How many people used the elevator from 07:00 to 09:00?

Unit 1, Practice 3

1. Complete.

- | | | | |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| a) $5 \text{ m} = ? \text{ cm}$ | b) $600 \text{ cm} = ? \text{ m}$ | c) $4 \text{ cm} = ? \text{ mm}$ | d) $80 \text{ mm} = ? \text{ cm}$ |
| e) $2000 \text{ m} = ? \text{ km}$ | f) $4 \text{ km} = ? \text{ m}$ | g) $70 \text{ cm} = ? \text{ dm}$ | h) $9 \text{ dm} = ? \text{ cm}$ |
| i) $2 \text{ dm} = ? \text{ mm}$ | j) $600 \text{ mm} = ? \text{ dm}$ | k) $190 \text{ dm} = ? \text{ m}$ | l) $1.5 \text{ m} = ? \text{ dm}$ |
| m) $84 \text{ cm} = ? \text{ m}$ | n) $3.4 \text{ m} = ? \text{ cm}$ | o) $18 \text{ mm} = ? \text{ cm}$ | p) $7.4 \text{ cm} = ? \text{ mm}$ |
| q) $900 \text{ m} = ? \text{ km}$ | r) $0.5 \text{ km} = ? \text{ m}$ | s) $840 \text{ mm} = ? \text{ dm}$ | t) $1 \text{ dm} = ? \text{ m}$ |

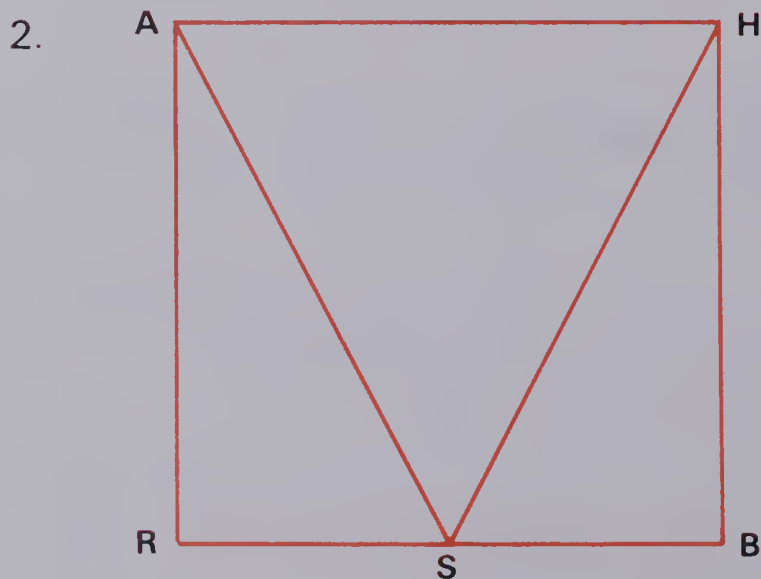
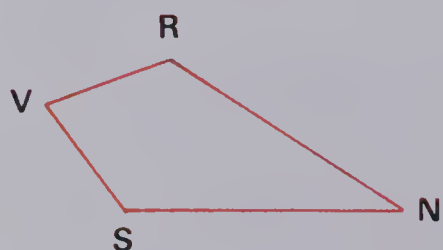
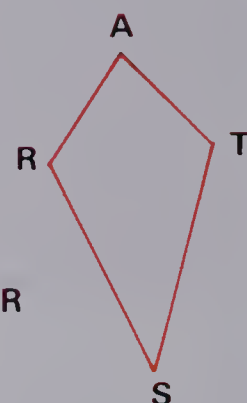
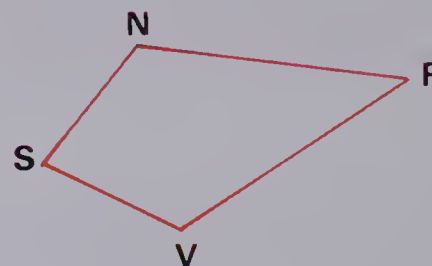
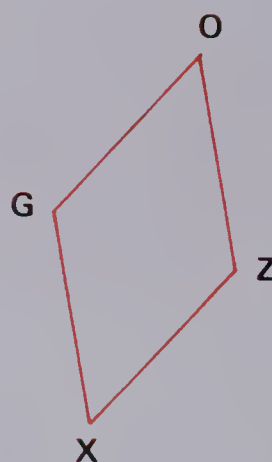
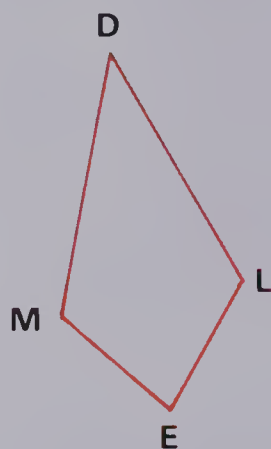
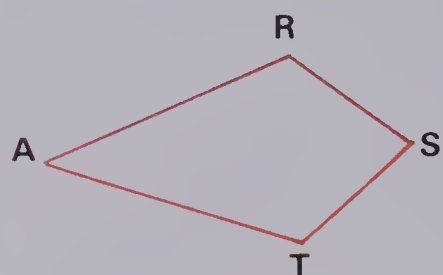
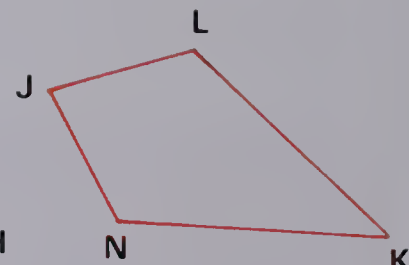
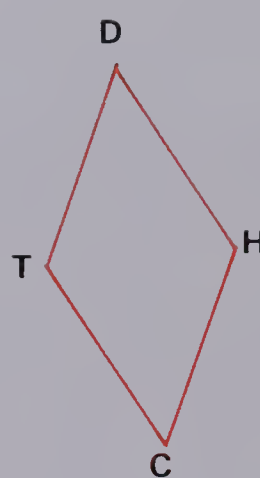
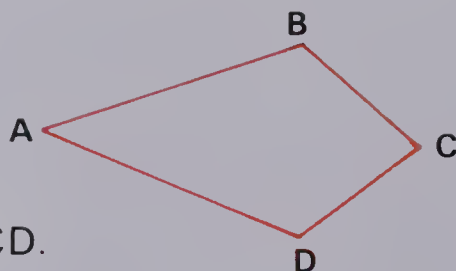
2. Find the perimeter of each figure.



- A bus carries 45 passengers.
How many buses are required for a school trip for 135 students?
- The cost of hiring 3 buses is \$135.
What is the cost per student if 135 students go on the trip?
- 270 sandwiches were made for the school trip.
How many sandwiches will each of the 135 students receive?
- The cost of the bread is \$10.80, the cost of butter is \$8.46, and the cost of cheese is \$15.60.
What is the total cost?
- The total amount collected from the students was \$270. How much did each of the 135 students pay?
- The total cost of hiring 3 buses is \$135. What is the cost for 1 bus?
- Each package of cookies costs \$0.89. 9 packages are required for the trip.
How much will 9 packages cost?
- If 1 loaf of bread makes 10 sandwiches, how many loaves are required for 270 sandwiches?
- \$40.00 was budgeted for milk. The bill is \$33.75.
How much money is left?
- The buses will leave the school at 09:30 and return at 15:00.
How long will they be away?

Unit 1, Check 4

1. Trace and cut out a model of this figure. Find and list those figures that are congruent to ABCD.



- How many right angles are there in the diagram?
- Name a triangle with a right angle.
- What types of angles are contained in $\triangle ASH$?
- What type of angle is $\angle RAS$?
- Name the angle congruent to $\angle RAS$.
- $\angle RAH - \angle RAS = \angle ?$
- Name an angle congruent to $\angle BSH$.

3. Complete.

a) $3 \ell = ? \text{ ml}$

e) $4 \text{ kl} = ? \ell$

i) $5 \text{ kg} = ? \text{ g}$

m) $7 \text{ g} = ? \text{ mg}$

q) $2 \text{ t} = ? \text{ kg}$

b) $400 \text{ ml} = ? \ell$

f) $4000 \ell = ? \text{ kl}$

j) $4.1 \text{ kg} = ? \text{ g}$

n) $0.9 \text{ g} = ? \text{ mg}$

r) $2.2 \text{ t} = ? \text{ kg}$

c) $8.3 \ell = ? \text{ ml}$

g) $2.06 \text{ kl} = ? \ell$

k) $3000 \text{ g} = ? \text{ kg}$

o) $2100 \text{ mg} = ? \text{ g}$

s) $734 \text{ kg} = ? \text{ t}$

d) $386 \text{ ml} = ? \ell$

h) $732 \ell = ? \text{ kl}$

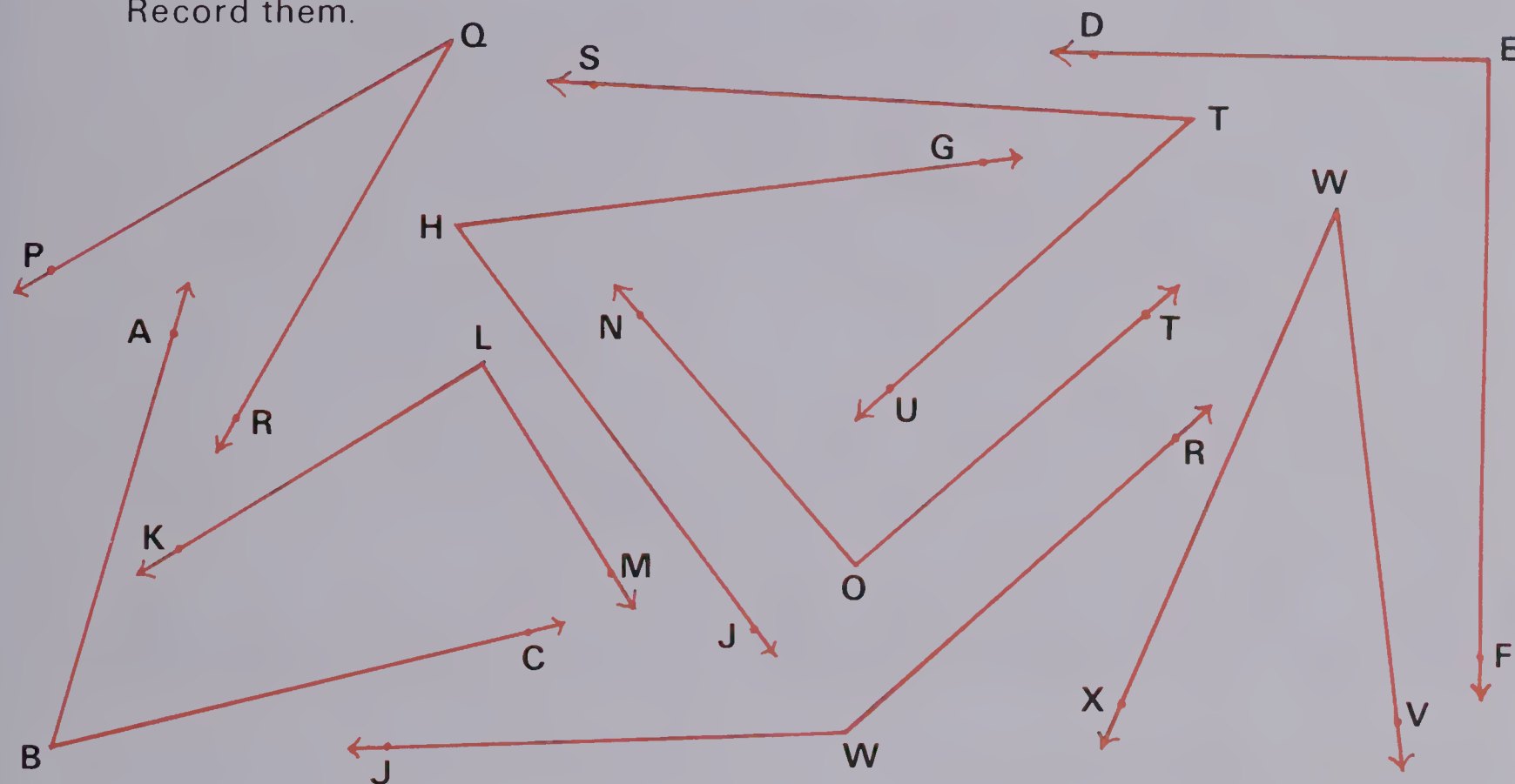
l) $2016 \text{ g} = ? \text{ kg}$

p) $638 \text{ mg} = ? \text{ g}$

t) $21 \text{ kg} = ? \text{ t}$

Unit 1, Practice 4

1. a) Use your protractor to find the pairs of congruent angles. Record them.



- b) Name all the angles that are
- right angles
 - acute angles
 - obtuse angles.

- c) Complete.
- $180^\circ - \angle PQR = ?^\circ$ which is a ? angle.
- $180^\circ - \angle KLM = ?^\circ$ which is a ? angle.
- $180^\circ - \angle JWR = ?^\circ$ which is a ? angle.

2. Complete.

- a) $2 \ell = ? \text{ ml}$ b) $600 \text{ ml} = ? \ell$ c) $3.4 \ell = ? \text{ ml}$ d) $234 \text{ ml} = ? \ell$
e) $2 \text{ kl} = ? \ell$ f) $6000 \ell = ? \text{ kl}$ g) $1.72 \text{ kl} = ? \ell$ h) $840 \ell = ? \text{ kl}$
i) $4 \text{ kg} = ? \text{ g}$ j) $2.4 \text{ kg} = ? \text{ g}$ k) $4000 \text{ g} = ? \text{ kg}$ l) $1460 \text{ g} = ? \text{ kg}$
m) $2 \text{ g} = ? \text{ mg}$ n) $0.5 \text{ g} = ? \text{ mg}$ o) $1800 \text{ mg} = ? \text{ g}$ p) $450 \text{ mg} = ? \text{ g}$
q) $4 \text{ t} = ? \text{ kg}$ r) $1.5 \text{ t} = ? \text{ kg}$ s) $560 \text{ kg} = ? \text{ t}$ t) $46 \text{ kg} = ? \text{ t}$

3. The masses of 4 people are 70 kg, 81 kg, 102 kg, and 86 kg
- What is the total mass in kilograms of the 4 people?
 - Express the total mass in tonnes.
 - How many kilograms short of 1 t is the total mass?

Answers Unit 1, Check 1

1. a) 9740 b) 0479 c) 9261 d) 7940, 0794 e) 4970, 4079
2. a) 240 b) 22.8 c) 1207 d) 213.0 e) 18 873 f) 73 434 g) 11.130
3. a) \$12.79 b) \$59.81 c) \$31.42 d) \$2.05 e) \$165.75
4. a) 111 b) 103 c) 5.17 d) 1665 e) 421.9 f) 2407
5. a) \$5569 b) \$4501 c) \$1747 d) \$0.44 d) \$42.41 f) 99.76

6.

Power form	Factor form	Number of times factor is used	Standard numeral
a) 4^4	$4 \times 4 \times 4 \times 4$	4	256
b) 7^3	$7 \times 7 \times 7$	3	343
c) 2^5	$2 \times 2 \times 2 \times 2 \times 2$	5	32
d) 5^5	$5 \times 5 \times 5 \times 5 \times 5$	5	3125
e) 10^6	$10 \times 10 \times 10 \times 10 \times 10 \times 10$	6	1 000 000

Answers Unit 1, Check 2

1. a) 40 b) 900 c) 5 d) 30 e) 10 f) 100 g) 1.2 h) 3.56
 i) 0.14 j) 32 k) 780 l) 0.56 m) 8140 n) 39 o) 0.390
 p) 407 q) 0.05 r) 60 s) 0.88 t) 9
2. a) 184 b) 282 c) 729 d) 185 e) 623 f) 168 g) 204 h) 666
 i) 544 j) 3800 k) 3066 l) 4056 m) 5526 n) 1652 o) 2520 p) 1110
3. a) 21.5 b) 53.2 c) 12 d) 24.3 e) 138.6 f) 705.6 g) 4.72
 h) 4.41 i) 31.9 j) 7.472
4. a) 384 b) 684 c) 1596 d) 2822 e) 2436 f) 2821 g) 2000
 h) 1320 i) 93 j) 103.6 k) 723.8 l) 530.4 m) 32.76
 n) 35.99 o) 548.8 p) 40.32 q) 9.45 r) 41.16 s) 28.12
 t) 22.96 u) 1.008 v) 2.205 w) 0.768 x) 2.254
5. 34.2 m 6. 79.5 m

Answers Unit 1, Check 3

1.

Side	centimetres (cm)	Length in: decimetres (dm)	millimetres (mm)	metres (m)
<i>a</i>	2	0.2	20	0.02
<i>b</i>	2.5	0.25	25	0.025
<i>c</i>	5.5	0.55	55	0.055
<i>d</i>	4	0.4	40	0.04
<i>e</i>	0.5	0.05	5	0.005

2. 3 cm 3. a) 9 cm b) 3 cm 4. 16 5. 32 6. 125 7. 93

Answers Unit 1, Check 4

1. STAR, NRVS, MELD JLKN

2. a) 4 b) $\triangle ARS$ or $\triangle HSB$ c) acute angles d) acute angle
e) $\angle BHS$ f) $\angle SAH$ g) $\angle RSA$

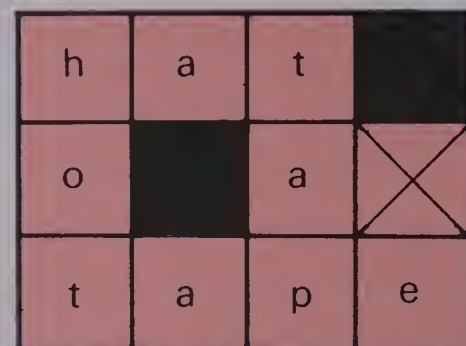
3. a) 3000 b) 0.4 c) 8300 d) 0.386 e) 4000 f) 4 g) 2060
h) 0.732 i) 5000 j) 4100 k) 3 l) 2.016 m) 7000 n) 900
o) 2.1 p) 0.638 q) 2000 r) 2200 s) 0.734 t) 0.021



Make Your Own Crossword Puzzle

1. Start with a piece of squared paper.
Include some black squares.
2. Fill the spaces with as many words
as you can. They must fit both horizontally
and vertically.
Put an X in the squares that you don't use.
3. Each letter in your puzzle scores
the number of points shown in the chart.

A, S, W — 12	I, J, K, O — 21	C, L, Z — 30
E, R, T, V — 15	B, M, N, Y — 24	P, Q — 40
D, F, X — 18	G, H, U — 27	



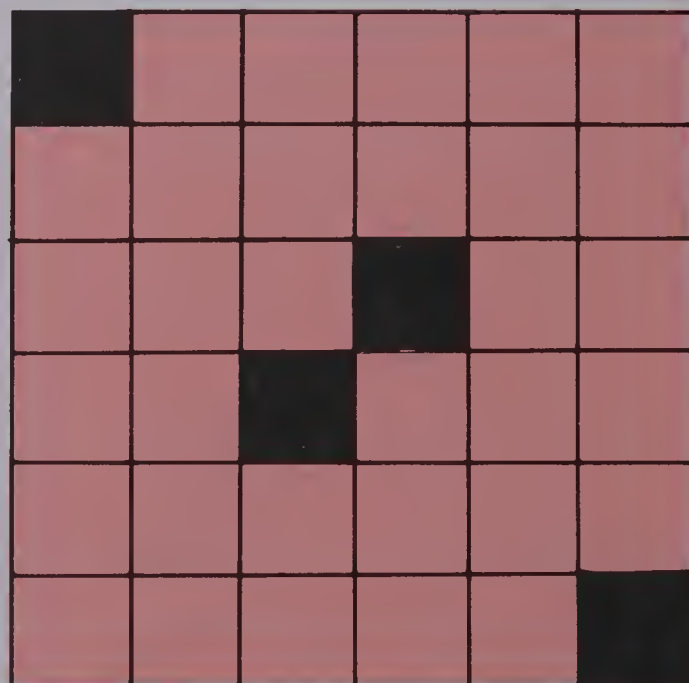
Score: — 169 points

Find the number of points your puzzle scores.

Make a crossword pattern like this one.
Fill in the squares and find your score.

Try again to see if you can
make a higher score.

Make a crossword pattern of your own.
Give a copy to a friend to fill in.

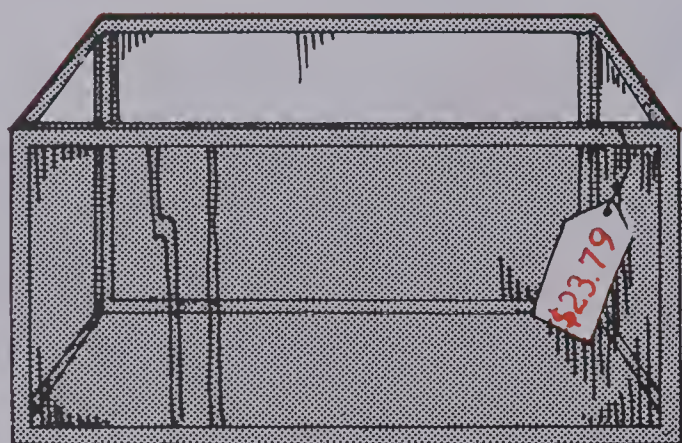




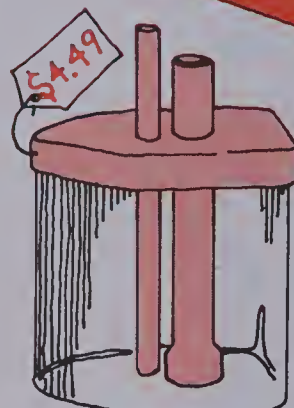
EXPLORE

APPLICATIONS OF ADDITION AND SUBTRACTION Setting Up An Aquarium

DOOLITTLE'S PET SHOP



aquarium (50 l)



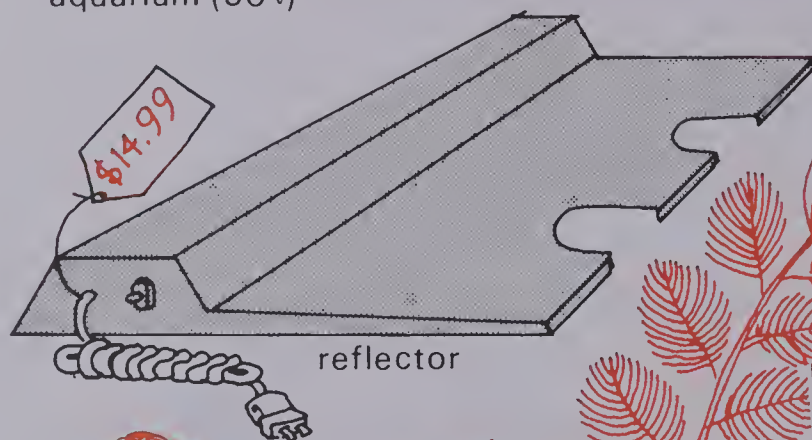
filter



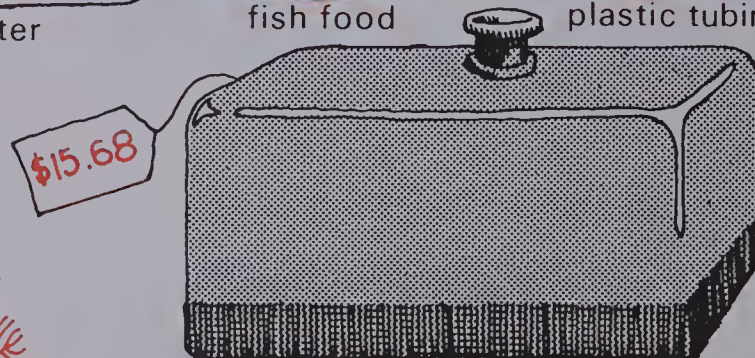
fish food



plastic tubing



reflector



pump



lace plant



fanwort



watersprite



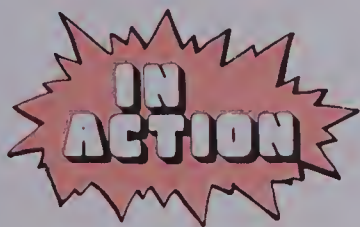
gravel (2 kg)



The students in Mrs. Hietala's class had been learning about fish. During a group discussion, one of the students suggested that they would find out more about fish if they set up their own aquarium. The students put the idea to a vote and

it was passed unanimously.

They studied an advertisement in the morning paper. You study it with them and help them answer these questions. The class has a bank balance of \$74.39.



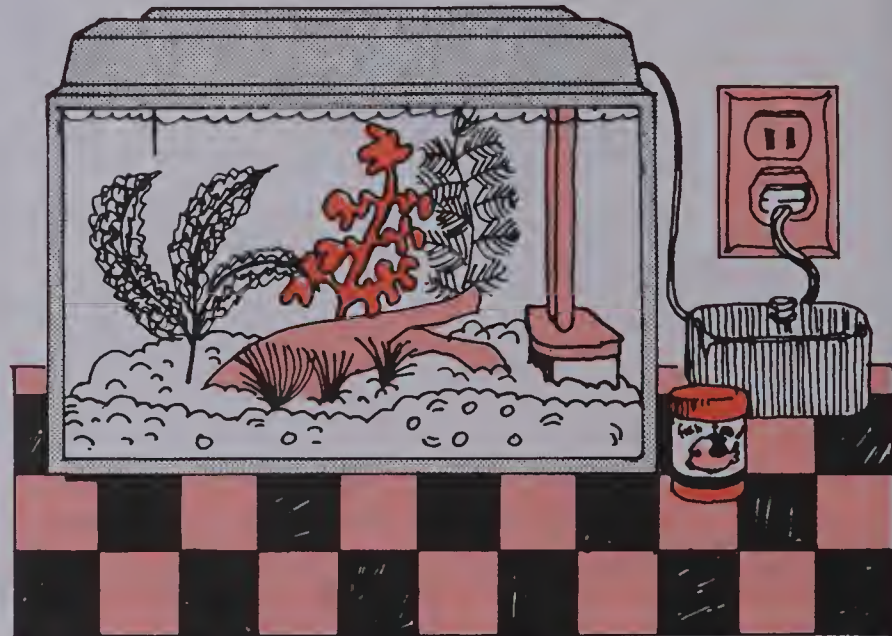
1. How much money would the students have left in their bank account if they bought the "starter kit special"?
3. What is the total value, at the regular price, of:
 - a) the 3 most expensive items
 - b) the 3 least expensive items
 - c) the rest of the items?
4. Could the class buy all the items if they had to pay the regular prices?
2. When they went to the pet store, the students gave the salesclerk one \$20 bill, three \$10 bills, one \$5 bill, and three \$2 bills for the special "starter kit".
 - a) How much more money did they owe the salesclerk?
 - b) What is the least number of coins the students could use to make up the difference (using pennies, nickels, dimes, and quarters)?
 - c) Give the number of each type of coin that would be used.

Buying the Fish

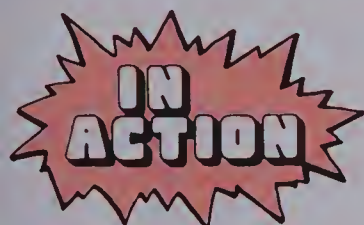
Once the class had their aquarium set up, it was time to buy some fish. So that too many fish are not put into a tank, a point system is used. A 50 l tank can support fish with a total point count of 500.

3 groups of students made up these lists. The students had \$45.00 to spend.

- Which is the best list? Why?
- What is the point count for each list?
- What would be the cost for the fish in each list?



Egglayers	Points	Cost per Fish	List 1	List 2	List 3
Angelfish	10	\$1.49	2	4	6
Black Tetra	5	1.59	2	2	0
Blue Gourami	6	1.98	2	2	0
Discus	25	7.98	2	0	2
Gold Barb	15	1.29	2	2	0
Kissing Gourami	7	1.98	2	2	0
Live Bearers					
Swordtails	8	1.29	2	4	0
Fancy Guppies	6	1.89	2	4	6
Mollies	9	1.09	2	4	0
Scavengers					
Algae Eater	15	0.98	2	2	0
Loach	5	1.19	2	0	0
Redtailed Shark	12	3.98	2	0	2



1. How much would you save?

a)

Gravel
~~\$2.39~~ \$1.71

b)

Filter
~~\$4.49~~ \$3.77

c)

Pump
~~\$15.68~~ \$12.89

2. How much change?

a)

\$0.98
1.36
3.49
0.34
TOTAL ?

b)

\$2.76
5.83
1.95
4.99
TOTAL ?

c)

\$13.66
4.93
1.29
1.48
TOTAL ?

3. What is the new bank balance?

a) Previous balance \$29.45

Spent

\$6.54
8.23
2.49
TOTAL ?

b) Previous balance \$38.64

Spent

\$19.48
7.99
0.57
TOTAL ?

c) Previous balance \$79.03

Spent

\$21.95
13.46
3.09
9.88
TOTAL ?

4. The salesclerk gave the students \$3.56 in change. Name the bills and coins and the number of each, if they were given

- a) 2 bills and 4 coins
- b) 3 bills and 5 coins
- c) 1 bill and 8 coins
- d) 1 bill and 17 coins

5. From another purchase the students received \$7.87 in change. Name the bills and coins and the number of each if they received

- a) 2 bills and 6 coins
- b) 3 bills and 8 coins
- c) 4 bills and 7 coins
- d) 3 bills and 12 coins

EXPLORE

EVEN AND ODD NUMBERS

Think about dividing a whole number by 2.

$0 \div 2 = 0$	$10 \div 2 = 5$	$20 \div 2 = ?$
$2 \div 2 = 1$	$12 \div 2 = 6$	$42 \div 2 = ?$
$4 \div 2 = 2$	$14 \div 2 = ?$	$34 \div 2 = ?$
$6 \div 2 = 3$	$16 \div 2 = ?$	$156 \div 2 = ?$
$8 \div 2 = 4$	$18 \div 2 = ?$	$238 \div 2 = ?$

Can you tell whether a whole number is divisible by 2 by considering the units digit of the number?

List the possible digits for the units place of a number if it is divisible by 2.

List the possible digits for the units place of a number if it is not divisible by 2.

A whole number that is evenly divisible by 2 is called an **even number**.

One that is not evenly divisible by 2 is called an **odd number**.

Generate the even numbers this way:

$$0 \times 2, 1 \times 2, 2 \times 2, 3 \times 2, 4 \times 2, 5 \times 2, 6 \times 2, \dots$$

By using a letter symbol, you can represent all the even numbers without making a list.

$2 \times n$, where n is 0, 1, 2, 3, ..., represents the even numbers.

Generate the odd numbers this way:

$$0 \times 2 + 1, 1 \times 2 + 1, 2 \times 2 + 1, 3 \times 2 + 1, \\ 4 \times 2 + 1, 5 \times 2 + 1, 6 \times 2 + 1, \dots$$

Using a letter symbol, you would write

$2 \times n + 1$, where $n = 0, 1, 2, 3, \dots$, represents the odd numbers.

Start with $2 \times n$.

Form the even numbers from 0 to 20.

Start with $2 \times n + 1$.

Form the odd numbers from 1 to 21.

2

4

6

8

3

5

7

9



IN ACTION

1. Investigate. List 5 examples for each case.
 - a) add 2 even numbers
 - b) add 2 odd numbers
 - c) subtract an even number from an even number
 - d) subtract an odd number from an even number
 - e) subtract an even number from an odd number
 - f) subtract an odd number from an odd numberRecord your conclusions.
2. Investigate multiplying even and odd numbers. Record your conclusions.
3. Investigate dividing even and odd numbers. Record your conclusions.
4. Generate the even numbers for $2 \times k$, where $k = 5, 7, 9, 11$.
5. Generate the odd numbers for $2 \times p + 1$, where $p = 3, 4, 5, 6, 7, 8$.
6. Could you use $2 \times n - 1$ to generate odd numbers?
7. Recall that 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ... are square numbers.

We could use $n \times n$ to represent the square numbers.

 - a) Which square numbers are even? Which are odd?
 - b) If a square number $n \times n$ is even, can you draw any conclusion about n ?



EXPLORE

DIVISION/Long Division/2-Digit Divisor

Divide 368 by 16.

$$\begin{array}{r} 23 \\ 16 \overline{) 368} \end{array}$$

$$\begin{array}{r} 32 \\ \underline{} \\ 48 \end{array}$$

$$\begin{array}{r} 48 \\ \underline{} \\ 0 \end{array}$$

Think

How many 16's are there in 36? — About 2
Write 2 above the 6.

$16 \times 2 = 32$ Write 32 below the 36.

Subtract. Bring down the 8 beside the 4.

How many 16's are there in 48? — 3

Write 3 above the 8.

$16 \times 3 = 48$ Write 48 below the 48.

Subtract.

$$368 \div 16 = 23$$

Check:

$368 \div 16$ is about

$400 \div 20$, or 20.

The quotient 23 is reasonable.



1. Complete.

a)
$$\begin{array}{r} 1? \\ 12 \overline{) 228} \\ \underline{12} \\ 108 \\ \underline{} \\ ? \end{array}$$

b)
$$\begin{array}{r} 1? \\ 14 \overline{) 252} \\ \underline{14} \\ ?2 \\ \underline{} \\ ? \end{array}$$

c)
$$\begin{array}{r} 2? \\ 16 \overline{) 432} \\ \underline{} \\ ? \\ \underline{} \\ ?2 \\ \underline{} \\ ? \end{array}$$

d)
$$\begin{array}{r} 2? \\ 23 \overline{) 644} \\ \underline{46} \\ 18? \\ \underline{} \\ ? \end{array}$$

2. Divide.

a) 342 by 18

b) 208 by 13

c) 390 by 15

d) 357 by 17

e) 336 by 21

f) 504 by 24

g) 702 by 26

h) 644 by 28

3. There were 224 boys at the hockey school.
If there were 16 groups,
how many boys were in each group?



Long Division/2-Digit Divisor

Divide 2268 by 18.

$$\begin{array}{r} 126 \\ 18 \overline{) 2268} \end{array}$$

$$\begin{array}{r} 18 \\ \underline{46} \end{array}$$

$$\begin{array}{r} 36 \\ \underline{108} \end{array}$$

$$\begin{array}{r} 108 \\ \underline{0} \end{array}$$

Think

How many 18's are there in 22?—About 1
Write 1 above the 2.

$18 \times 1 = 18$ Write 18 below the 22.

Subtract. Bring down the 6 beside the 4.

How many 18's are there in 46?—About 2
Write 2 above the 6.

$18 \times 2 = 36$ Write 36 below the 46.

Subtract. Bring down the 8 beside the 0.

How many 18's are there in 108?—6
Write 6 above the 8.

$18 \times 6 = 108$ Write 108 below the 108.

Subtract.

$$2268 \div 18 = 126$$

Check:

Since $2268 \div 18$ is about
 $2000 \div 20$, or 100,
the quotient 126 is reasonable.

**IN
ACTION**

1. Divide.

- | | |
|---------------|---------------|
| a) 2144 by 16 | b) 2159 by 17 |
| c) 2242 by 19 | d) 2898 by 21 |
| e) 3024 by 14 | f) 3906 by 18 |
| g) 5313 by 23 | h) 5668 by 26 |

2. How many shelves would it take to hold
864 books if 24 books were placed on each shelf?



2-Digit Divisor/Decimals

If there is a decimal point in the number,
place a decimal point
in the quotient directly above it.

$$368 \div 16 = 23$$

Divide 36.8 by 16.

$$\begin{array}{r} 2.3 \\ 16 \overline{) 36.8} \\ \underline{32} \\ 48 \\ \underline{48} \\ 0 \end{array}$$

$$36.8 \div 16 = 2.3$$

Divide 3.68 by 16.

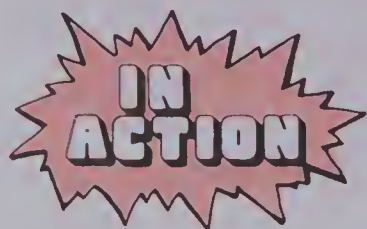
$$\begin{array}{r} 0.23 \\ 16 \overline{) 3.68} \\ \underline{32} \\ 48 \\ \underline{48} \\ 0 \end{array}$$

$$3.68 \div 16 = 0.23$$

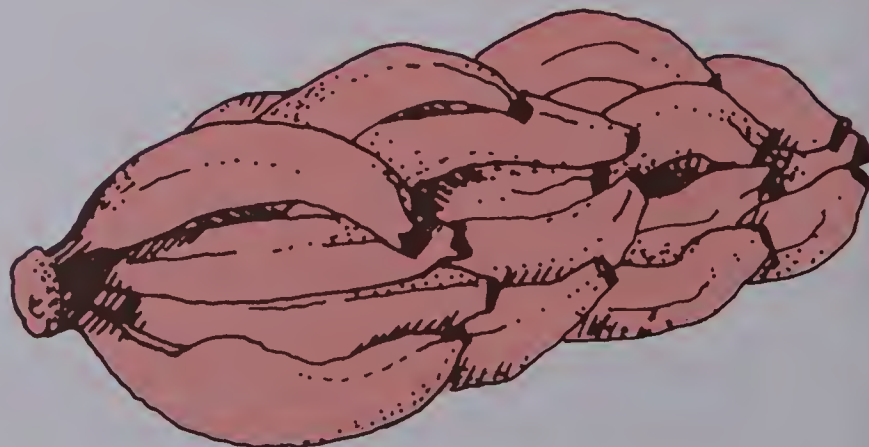
Divide 0.368 by 16.

$$\begin{array}{r} 0.023 \\ 16 \overline{) 0.368} \\ \underline{32} \\ 48 \\ \underline{48} \\ 0 \end{array}$$

$$0.368 \div 16 = 0.023$$



- $414 \div 18 = 23$ What are the quotients?
 - $41.4 \div 18$
 - $4.14 \div 18$
 - $0.414 \div 18$
 - $4140 \div 18$
- Divide.
 - 442 by 17
 - 44.2 by 17
 - 4.42 by 17
 - 0.442 by 17
- Divide.
 - 45.6 by 19
 - 3.08 by 14
 - 0.351 by 13
 - 4.05 by 15
 - 39.9 by 21
 - 0.476 by 28
 - 48.3 by 21
 - 6.48 by 27
 - 0.468 by 26
 - 6.44 by 23
 - 49.6 by 16
 - 6.66 by 18
- If a package of 36 cookies costs \$2.52, what is the cost of 1 cookie?
- If a box of 15 rulers costs \$4.35, what is the cost of 1 ruler?





2-Digit Divisor/Decimals

$2268 \div 18 = 126$

Divide 22.68 by 18.

$$\begin{array}{r} 1.26 \\ 18 \overline{) 22.68} \\ \underline{18} \\ 46 \\ \underline{36} \\ 108 \\ \underline{108} \\ 0 \end{array}$$

$22.68 \div 18 = 1.26$

Divide 226.8 by 18.

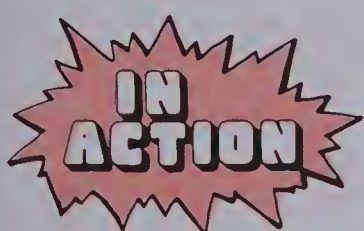
$$\begin{array}{r} 12.6 \\ 18 \overline{) 226.8} \\ \underline{18} \\ 46 \\ \underline{36} \\ 108 \\ \underline{108} \\ 0 \end{array}$$

$226.8 \div 18 = 12.6$

Divide 2.268 by 18.

$$\begin{array}{r} 0.126 \\ 18 \overline{) 2.268} \\ \underline{18} \\ 46 \\ \underline{36} \\ 108 \\ \underline{108} \\ 0 \end{array}$$

$2.268 \div 18 = 0.126$



1. Complete.

a)
$$\begin{array}{r} 2?? \\ 19 \overline{) 4047} \\ \underline{38} \\ ?4 \\ \underline{?} \\ ?7 \\ \underline{?} \end{array}$$

b)
$$\begin{array}{r} 2.?? \\ 19 \overline{) 40.47} \\ \underline{38} \\ 2? \\ \underline{?} \\ ?? \\ \underline{?} \end{array}$$

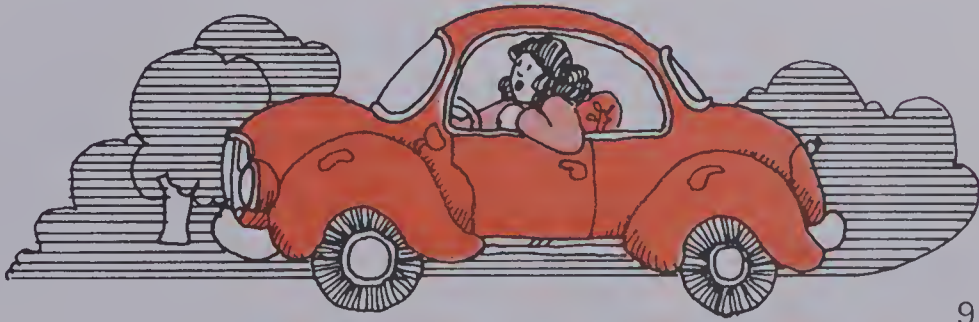
c)
$$\begin{array}{r} 0.2?? \\ 19 \overline{) 4.047} \\ \underline{38} \\ ?? \\ \underline{?} \\ ?? \\ \underline{?} \end{array}$$

d)
$$\begin{array}{r} ???.? \\ 19 \overline{) 404.7} \\ \underline{?} \\ ?? \\ \underline{?} \\ ?? \\ \underline{?} \end{array}$$

2. Divide.

- | | | | |
|----------------|----------------|----------------|----------------|
| a) 2278 by 17 | b) 22.78 by 17 | c) 2.278 by 17 | d) 227.8 by 17 |
| e) 26.18 by 14 | f) 3.696 by 16 | g) 42.53 by 23 | h) 4.495 by 31 |
| i) 5.778 by 27 | j) 453.6 by 24 | k) 64.68 by 28 | l) 7.776 by 32 |

3. Sandra drove 498.4 km.
Her car averaged 8 ℓ / 100 km.
How many litres of gas
did her car use?



EXPLORE

ROUNDING NUMBERS/Meaning

Consider this section of a number line.



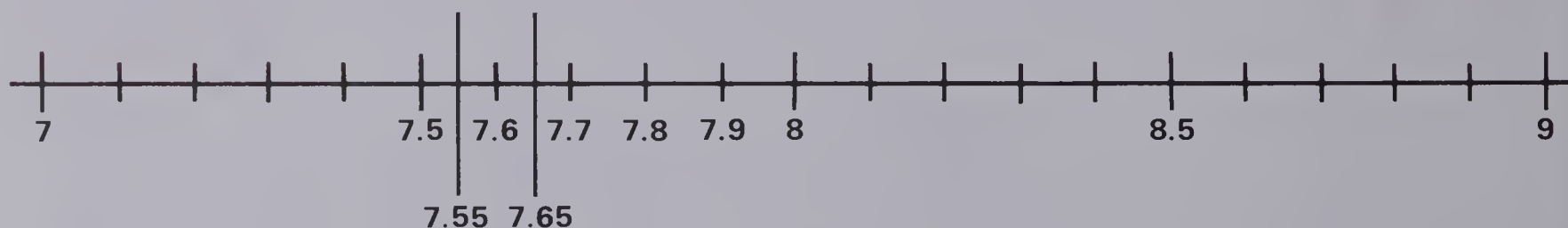
7.5 corresponds to the midpoint between 7 and 8.

Any number between 7.5 and 8 is closer to 8 than it is to 7.

$7.6 = 8$ to the nearest one
or 7.6 rounded to the nearest one is 8.

Any number between 8 and 8.5 is closer to 8 than it is to 9.

$8.4 = 8$ to the nearest one
or 8.4 rounded to the nearest one is 8.



7.55 corresponds to the midpoint between 7.5 and 7.6.

Any number between 7.55 and 7.6
is closer to 7.6 than it is to 7.5.
 $7.58 = 7.6$ to the nearest tenth
or 7.58 rounded to the nearest tenth is 7.6.

Any number between 7.6 and 7.65
is closer to 7.6 than it is to 7.7.
 $7.64 = 7.6$ to the nearest tenth
or 7.64 rounded to the nearest tenth is 7.6.



Rounding Numbers to the Nearest Tenth

If you understand rounding a number,
the rounding process is easy.

47.3**9** $9 > 5$, so 47.39 is closer to 47.4
than it is to 47.3.

47.39 = 47.4 to the nearest tenth

47.3**2** $2 < 5$, so 47.32 is closer to 47.3
than it is to 47.4.

47.32 = 47.3 to the nearest tenth

47.3**5** 47.35 is midway between 47.3 and 47.4.
If the digit before the 5 is odd, round up:

47.35 = 47.4 to the nearest tenth

If the digit before the 5 is even,
don't change it:

47.85 = 47.8 to the nearest tenth

47.851 is closer to 47.9 than it is to 47.8

47.851 = 47.9 to the nearest tenth

**IN
ACTION**

1. a) Is 28.34 closer to 28.3 or 28.4?
b) Is 67.16 closer to 67.1 or 67.2?
c) Is 94.253 closer to 94.2 or 94.3?

2. Round each number to the nearest tenth.

- | | | | | | |
|----------|----------|-----------|-----------|-----------|------------|
| a) 6.71 | b) 28.36 | c) 41.49 | d) 128.24 | e) 573.18 | f) 0.18 |
| g) 7.35 | h) 18.45 | i) 29.15 | j) 35.25 | k) 9.154 | l) 12.253 |
| m) 1.151 | n) 0.256 | o) 15.35 | p) 45.65 | q) 19.01 | r) 27.06 |
| s) 9.84 | t) 10.05 | u) 11.057 | v) 0.05 | w) 0.051 | x) 100.005 |



Quotients to the Nearest Tenth

Divide 261 by 14.

$$\begin{array}{r} 18 \\ 14 \overline{) 261} \\ \underline{14} \\ 121 \\ \underline{112} \\ 9 \end{array}$$

Think

How many 14's are there in 26?—About 1
How many 14's are there in 121?—About 8

There is a remainder, 9.

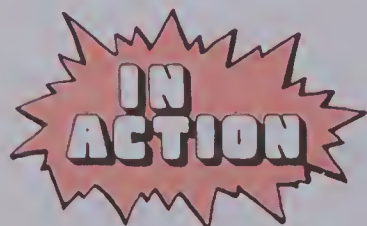
You can express the quotient to the nearest tenth
if you continue the division.

Write 261.00 for 261.

$$\begin{array}{r} 18.64 \\ 14 \overline{) 261.00} \\ \underline{14} \\ 121 \\ \underline{112} \\ 90 \\ \underline{84} \\ 60 \\ \underline{56} \\ 4 \end{array}$$

How many 14's are there in 90?—About 6
How many 14's are there in 60?—About 4

In the quotient 18.6**4**, $4 < 5$.
 $261 \div 14 = 18.6$ to the nearest tenth



Divide. Express the quotient to the nearest tenth.

a) $228 \div 13$

b) $355 \div 12$

c) $348 \div 16$

d) $457 \div 14$

e) $369 \div 17$

f) $438 \div 18$

g) $408 \div 21$

h) $509 \div 23$

i) $570 \div 17$

j) $639 \div 24$

The Digit 0 in a Quotient

Divide 141 by 13.

Express the quotient to the nearest tenth.

Write 141.00 for 141.

$$\begin{array}{r} 10.84 \\ 13 \overline{) 141.00} \\ \underline{13} \\ 11 \\ \underline{0} \\ 110 \\ \underline{104} \\ 60 \\ \underline{52} \\ 8 \end{array}$$

Think

How many 13's are there in 14?—About 1
How many 13's are there in 11?—Less than 1
Write 0 above the 1.

$$13 \times 0 = 0$$

How many 13's are there in 110?—About 8
How many 13's are there in 60?—About 4

In the quotient 10.84, $4 < 5$.

$$141 \div 13 = 10.8 \text{ to the nearest tenth}$$

Divide 350 by 17.

$$\begin{array}{r} 20.58 \\ 17 \overline{) 350.00} \\ \underline{34} \\ 10 \\ \underline{0} \\ 100 \\ \underline{85} \\ 150 \\ \underline{136} \\ 14 \end{array}$$

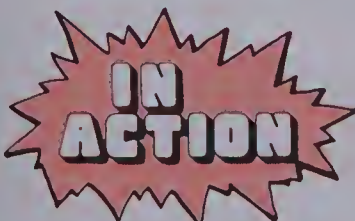
You can omit this step as long as you write 0 in the quotient.

$$\begin{array}{r} 20.58 \\ 17 \overline{) 350.00} \\ \underline{34} \\ 100 \\ \underline{85} \\ 150 \\ \underline{136} \\ 14 \end{array}$$

In the quotient 20.58, $8 > 5$.

$$350 \div 17 = 20.6 \text{ to the nearest tenth}$$

Divide. Express the quotient to the nearest tenth.



a) $173 \div 16$

b) $185 \div 17$

c) $190 \div 18$

d) $291 \div 14$

e) $287 \div 13$

f) $309 \div 14$

g) $337 \div 16$

h) $385 \div 12$

i) $491 \div 16$

j) $523 \div 17$

Quotients to the Nearest Tenth

Divide.

735.7 by 18

$$\begin{array}{r} 40.87 \\ 18 \overline{) 735.70} \\ \underline{72} \\ 157 \\ \underline{144} \\ 130 \\ \underline{126} \\ 4 \end{array}$$

In the quotient 40.8**7**,
 $7 > 5$.

$735.7 \div 18 = 40.9$
to the nearest tenth

73.57 by 18

$$\begin{array}{r} 4.08 \\ 18 \overline{) 73.57} \\ \underline{72} \\ 157 \\ \underline{144} \end{array}$$

In the quotient 4.0**8**,
 $8 > 5$.

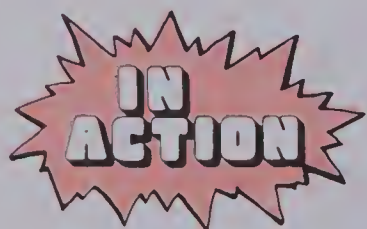
$73.57 \div 18 = 4.1$
to the nearest tenth

7.357 by 18

$$\begin{array}{r} 0.40 \\ 18 \overline{) 7.357} \\ \underline{72} \\ 15 \end{array}$$

In the quotient 0.4**0**,
 $0 < 5$.

$7.357 \div 18 = 0.4$
to the nearest tenth



1. Complete.

a)
$$\begin{array}{r} 410.?? \\ 13 \overline{) 5336.00} \\ \underline{52} \\ 13 \\ \underline{13} \\ 060 \\ \underline{?} \\ ?0 \\ \underline{?} \end{array}$$

$5336 \div 13 = ?$
to the nearest tenth

b)
$$\begin{array}{r} 4? ?? \\ 13 \overline{) 533.60} \\ \underline{52} \\ 13 \\ \underline{?} \\ 0?0 \\ \underline{?} \end{array}$$

$533.6 \div 13 = ?$
to the nearest tenth

c)
$$\begin{array}{r} 4.?? \\ 13 \overline{) 53.36} \\ \underline{52} \\ 1? \\ \underline{?} \\ ?6 \end{array}$$

$53.56 \div 13 = ?$
to the nearest tenth

2. Divide.

a) 5.336 by 13

b) 71.43 by 14

c) 614.9 by 15

d) 37.58 by 19

e) 43.62 by 21

f) 2569 by 24

g) 5893 by 26

h) 5.583 by 27

EXPLORE

DIVISION/Using Long Division

4 transistor 1.5 V batteries cost \$3.69.
What is the cost of 1 battery?

$$\begin{array}{r} 0.922 \\ 4 \overline{) 3.690} \\ \underline{36} \\ 09 \\ \underline{8} \\ 10 \\ \underline{8} \end{array}$$

In the quotient 0.92 **2**,
 $2 < 5$.

The cost of 1 battery
is 92¢ to the nearest cent.

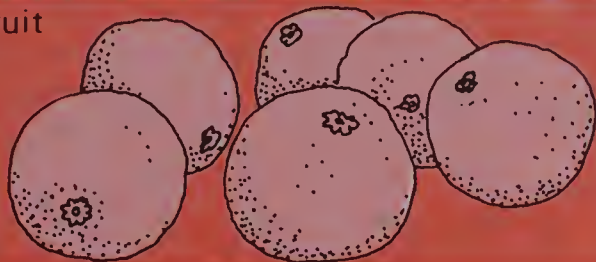
Check:

Since $3.69 \div 4$ is about
 $4.00 \div 4$ or 1.00,
0.92 seems to be correct.

**IN
ACTION**

1. Find the unit cost.
Give the answer to the nearest cent.

a) 6 grapefruit
89¢



b)

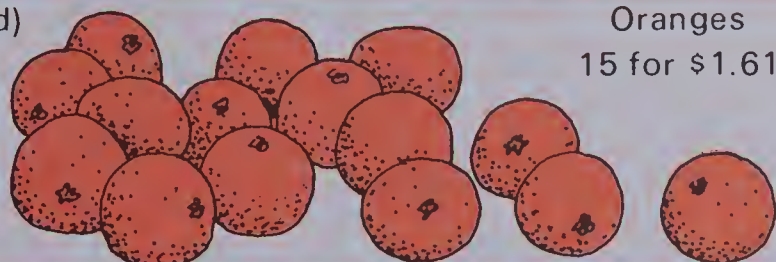


SPECIAL
5 Hot Dogs
\$1.65

c) Turkey
6 kg \$13.75



d)

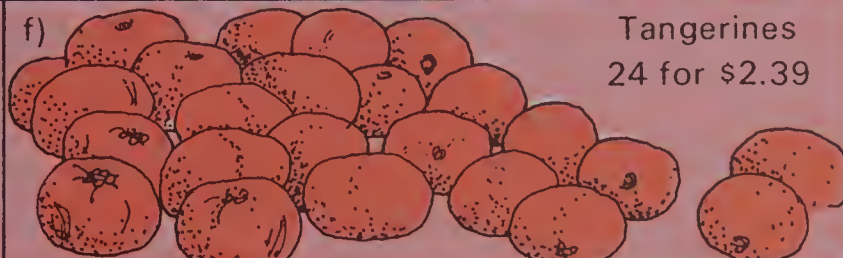


Oranges
15 for \$1.61

e) 12 Donuts
\$1.01



f)



Tangerines
24 for \$2.39

Retrace Your Steps

1. Complete the chart.

Question	Prediction even/odd	Answer	Question	Prediction even/odd	Answer
2×2	even	4, even	$64 \div 2$		
7×2			$(36 \times 2) + 1$		
2×14			$(23 \times 2) + 1$		
$42 \div 2$			$(100 \times 2) + 1$		

2. Divide.

- a) 273 by 13 b) 651 by 21 c) 342 by 19 d) 838 by 23 e) 754 by 26
 f) 532 by 14 g) 374 by 17 h) 924 by 22 i) 288 by 24 j) 855 by 15
 k) 1344 by 12 l) 2584 by 17 m) 1274 by 13 n) 4199 by 19 o) 3586 by 22
 p) 4464 by 24 q) 5916 by 27 r) 5742 by 29 s) 2856 by 21 t) 2954 by 14

3. Divide.

- a) 65.1 by 21 b) 4.75 by 25 c) 32.4 by 27 d) 2.97 by 27 e) 6.93 by 21
 f) 9.18 by 18 g) 71.3 by 23 h) 51.8 by 14 i) 3.61 by 19 j) 7.28 by 28
 k) 136.8 by 18 l) 561.6 by 26 m) 64.68 by 28 n) 21.24 by 18 o) 24.99 by 17
 p) 126.1 by 13 q) 33.44 by 19 r) 3.175 by 25 s) 2.992 by 22 t) 2.142 by 18

4. Round each number to the nearest tenth.

- a) 4.12 b) 17.89 c) 38.16 d) 104.92 e) 0.38 f) 0.86
 g) 6.55 h) 12.05 i) 0.94 j) 10.98 k) 0.491 l) 1.958

5. Find the answers. Express the quotients to the nearest tenth.

- a) $212 \div 12$ b) $364 \div 18$ c) $413 \div 13$ d) $197 \div 21$ e) $581 \div 17$
 f) $683 \div 23$ g) $287 \div 25$ h) $567 \div 19$ i) $741 \div 27$ j) $346 \div 17$

6. Find the answers. Express the quotients to the nearest tenth.

- a) $37.46 \div 14$ b) $5.961 \div 17$ c) $239 \div 19$ d) $57.91 \div 28$ e) $79.24 \div 22$
 f) $4.53 \div 13$ g) $879.6 \div 21$ h) $48.68 \div 15$ i) $1.87 \div 16$ j) $439.6 \div 26$

7. Find the answers. Express the quotients to the nearest tenth.

- a) $18.9 \div 1.8$ b) $806.7 \div 2.4$ c) $3.7 \div 0.6$ d) $42.1 \div 1.9$ e) $7 \div 0.3$
 f) $9.4 \div 0.23$ g) $15.4 \div 2.1$ h) $8.76 \div 1.4$ i) $3 \div 0.18$ j) $1.4 \div 0.06$

Puzzles

Copy and complete.

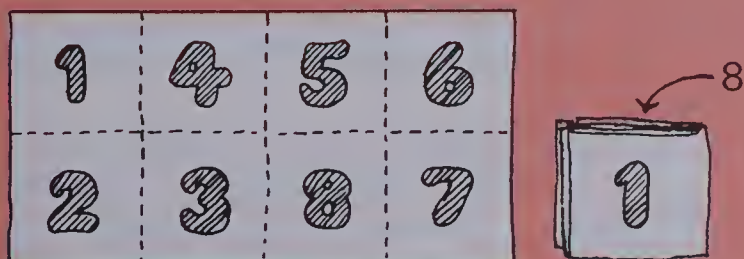
4	+	2	×	5	30
÷		×		×	
	×		—		1
+		÷		—	
	×		—		4
8		3		20	

8	÷	4	×	4	8
÷		÷		×	
	×		+		4
÷		÷		+	
	+		—		0
2		1		4	

Have you ever had difficulty folding a road map?

Fold a rectangular piece of paper into a square. Package as shown.

Start by dividing the rectangle into 8 squares. Number the squares on one side of the paper.



How many different ways can you find to fold this paper?

Can you fold the paper so that the numbers are in order from 1 to 8?



What is the least number of moves required to slide the 6 pennies from the triangular arrangement to the circular one?



EXPLORE

PROBLEM SOLVING STRATEGIES Using a Sketch or Diagram

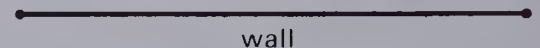
Sometimes a sketch will give the answer to a problem.
Read the problem and draw a sketch for the data given.

Problem A wall is 5 m long. Picture hooks are to be placed every 0.5 m along the wall.
How many hooks can be placed on the wall?

Sketch

A Use the scale 1 cm represents 1 m.

B Illustrate the wall by a line segment 5 cm long.



C Mark the line segment every 0.5 cm.



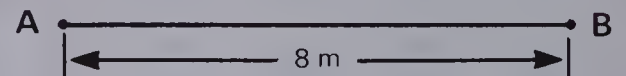
Would you place a hook at each end?
How would you solve the problem?

Sometimes a sketch will suggest the operation
required to solve the problem.

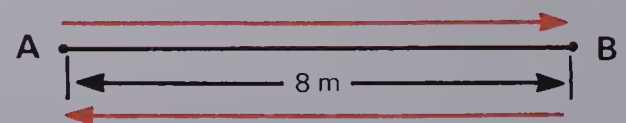
Problem The distance between 2 goals is 8 m.
A player runs from goal A to goal B and back again.
How many metres does he run?

Sketch

A Draw the 2 goals and mark the distance.



B Use arrows to show the pathway of the runner.



C Write a number sentence to show
the distance covered by the runner.

Organizing Information

Problem Organizing the data given in a problem can help you solve it.

2 cars competed in a rally. Each was timed at 4 checkpoints. The times for car A were: 1 h 13 min, 58 min, 2 h 13 min, and 1 h 47 min.

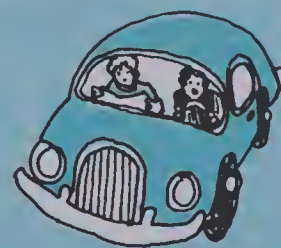
The times for car B were: 1 h 8 min, 1 h 6 min, 2 h 18 min, and 1 h 38 min.

Which car completed the course in the shorter time?

Make a chart showing the 4 times of each car.



Car	Time			
	Check 1	Check 2	Check 3	Check 4
A	1 h 13 min	58 min	2 h 13 min	1 h 47 min
B	1 h 8 min	1 h 6 min	2 h 18 min	1 h 38 min



Add a column for the total time travelled.

Car	Time				Total time
	Check 1	Check 2	Check 3	Check 4	
A	1 h 13 min	58 min	2 h 13 min	1 h 47 min	4 h 131 min = 6 h 11 min
B	1 h 8 min	1 h 6 min	2 h 18 min	1 h 38 min	5 h 70 min = 6 h 10 min

Which car won the rally?



Trial and Error

Many problems are solved by trial and error.



Here is a simple problem based on a famous one about wine jugs.

A scientist has 3 containers: 3 l, 2 l, and 1 l.

The 3 l container is filled with oil.

The scientist wants 1 l of oil in each container.

How can he do this if he only has the 3 containers?

Use a chart to help you find the solution.
It may reduce the number of steps you will use. Read the chart and tell what the scientist did to solve the problem.

Can you solve the problem in 2 steps?

There are 3 containers: 4 l, 3 l, and 1 l.

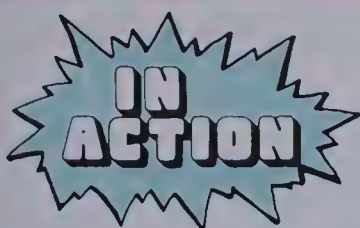
The 4 l container is filled with liquid.

How would you pour the liquid
so that the 4 l and 3 l containers each hold 2 l?

Containers	Amount of oil in each container			
	Start	Step 1	Step 2	Step 3
3 l	3 l	2 l	2 l	1 l
2 l	0 l	0 l	1 l	1 l
1 l	0 l	1 l	0 l	1 l

Container	Amount of liquid in each container				
	Start	Step 1	Step 2	Step 3	Step 4
4 l	4 l	3 l	3 l	2 l	
3 l	0 l	0 l			
1 l	0 l	1 l	0 l		

Complete the chart.
Can you solve the problem in 3 steps?
Tell how you solved the problem.



Making a Sketch

1. A garden is 10 m long and 15 m wide. Shrubs are to be planted 1 m apart down one side and across the end of the garden.
How many shrubs are required for the job?
Use a sketch to help determine the solution to this problem.
2. A rectangular lot is 50 m by 25 m. A house 15 m by 20 m is placed in one corner of the lot.
The remainder of the lot is lawn.
a) What are the measurements of the lawn?
b) What is the perimeter of the lawn?
Use a sketch to help determine the solution to this problem.

Organizing Information

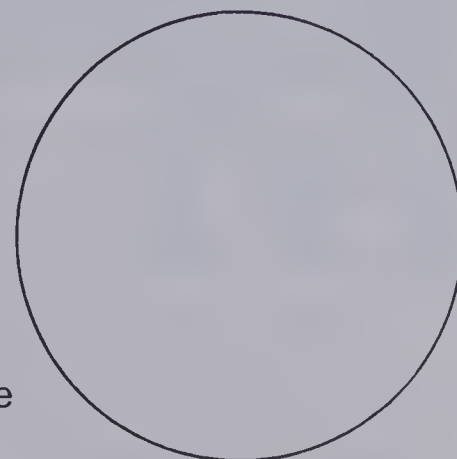
3. 4 students kept a record of the number of kilometres they travelled on their bicycles for 2 d. On the first day, student A travelled 10.2 km, student B 9.6 km, student C 5.9 km, and student D 11.4 km. On the second day, student A travelled 21.1 km, student B 24.6 km, student C 13.8 km, and student D 20.5 km.
a) Which student travelled the greatest distance in 2 d?
b) Which student travelled the least distance in 2 d?
c) How much further did student B travel than student A?

Trial and Error

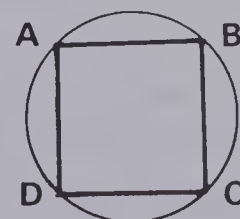
4. Copy these dots in your workbook.
Without lifting your pencil from the paper, use 4 straight lines to join all the dots.
(Hint: some lines go beyond the dots.)

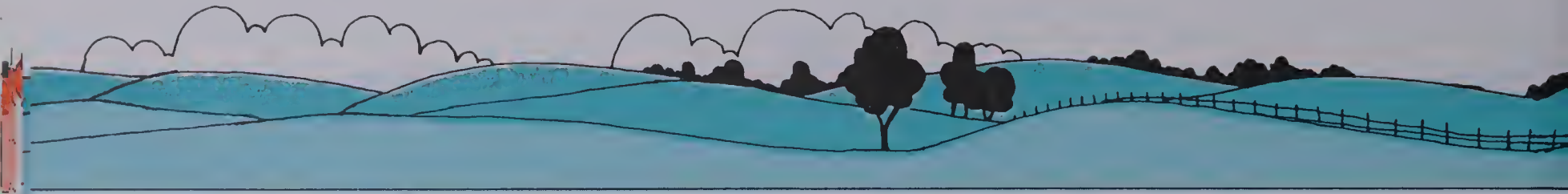


5. Investigate:
What is the largest square that will fit inside this circle?



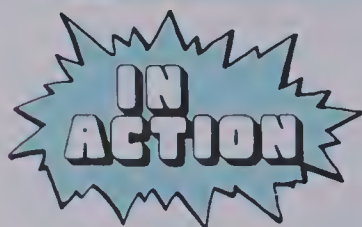
6. Discover a method for drawing a circle around a square so that the 4 vertices of the square are on the circle.





Number Patterns

How is this number pattern generated? $3, 7, 11, 15, \dots$ We start at 3 and add ? What are the next 4 terms?	How is this number pattern generated? $2, 4, 8, 16, \dots$ What are the next 4 terms? Express the pattern using a power form for each term.
How is this number pattern generated? $3, 8, 6, 11, 9, \dots$ There are 2 operations involved here. We start with 3 and ? then ? What are the next 4 terms?	How is this number pattern generated? $1, 4, 9, 16, \dots$ We write the squares of ? What are the next 4 terms?



- Wayne and Nancy each won their division of a marble tournament. They compared the numbers of marbles they had won after each game.

Name	Number of marbles won			
	Game 1	Game 2	Game 3	Game 4
Wayne	1	2	4	8
Nancy	5	10	15	20

- Which player had won the greater number of marbles at the end of 4 games?
- A farmer kept a record of the number of brown and white eggs that he collected. The first day he collected 2 brown eggs and 1 white egg. The second day he collected 4 brown and 4 white. The third day he collected 6 brown and 7 white.
 - Write the number pattern for the number of brown eggs and the number of white eggs.
 - Suppose the pattern continued for 10 d. How many brown and white eggs did he collect on the fourth day?
 - On which day will he have 6 more white eggs than brown eggs?
- What is the number pattern for the number of marbles that Wayne won?
- What is the number pattern for the number of marbles that Nancy won?
- Draw and continue the chart for 9 games. How many games must Wayne play before he has more marbles than Nancy?

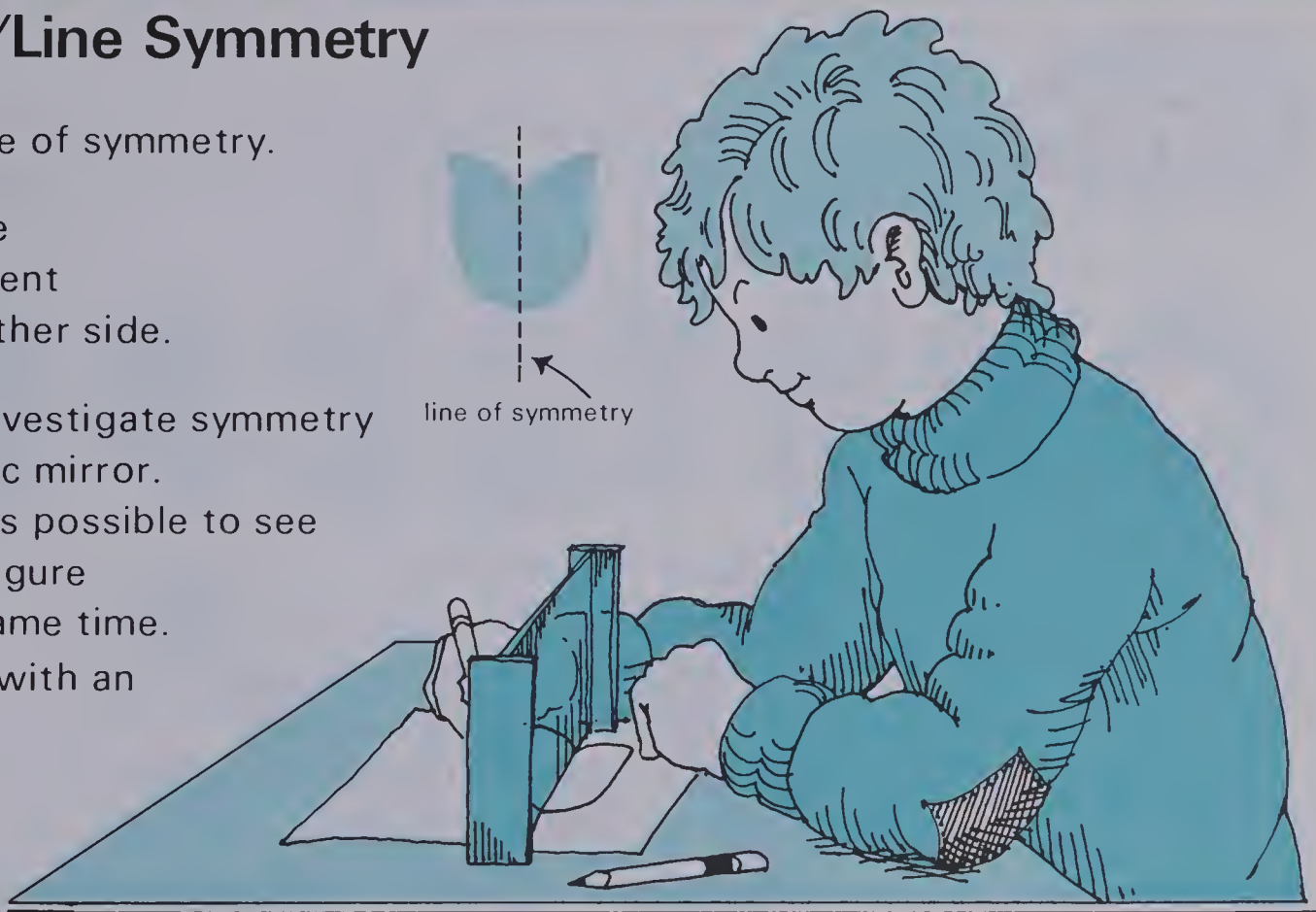
EXPLORE

SYMMETRY/Line Symmetry

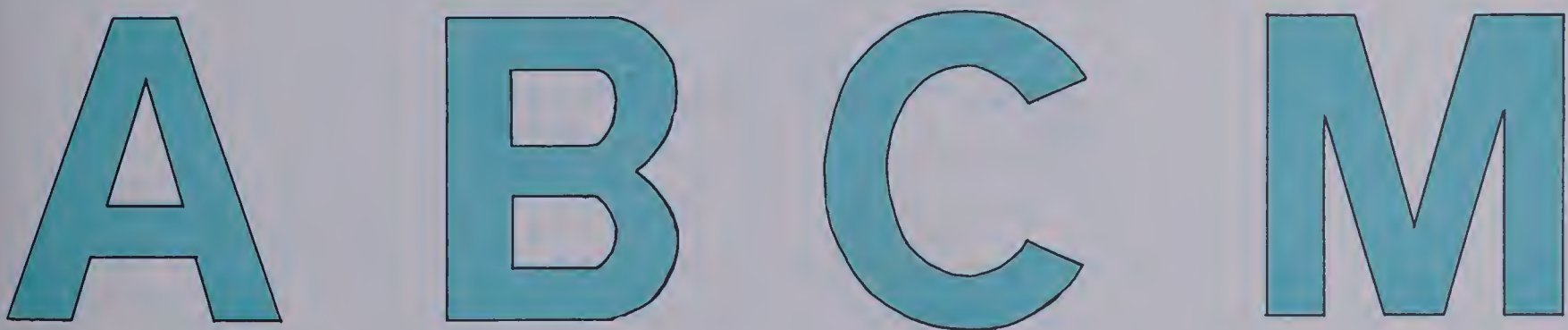
This shape has 1 line of symmetry.

The part on one side of the line is congruent to the part on the other side.

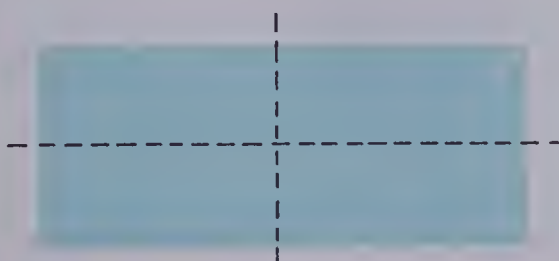
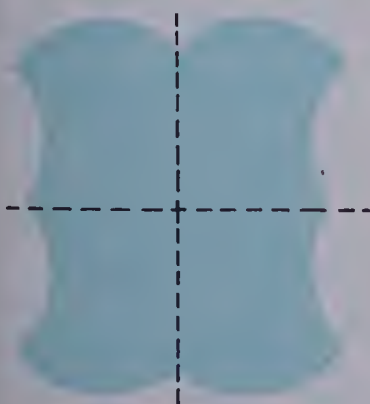
It is interesting to investigate symmetry by using a red plastic mirror. With this device, it is possible to see the reflection of a figure and draw it at the same time. This is not possible with an ordinary mirror.



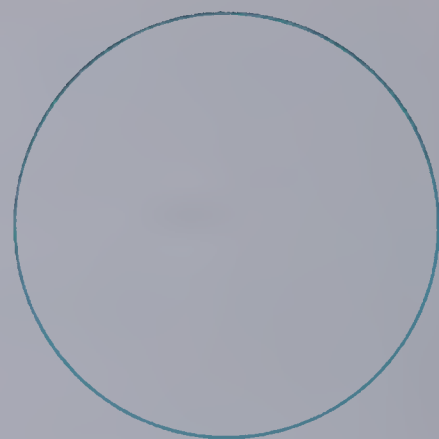
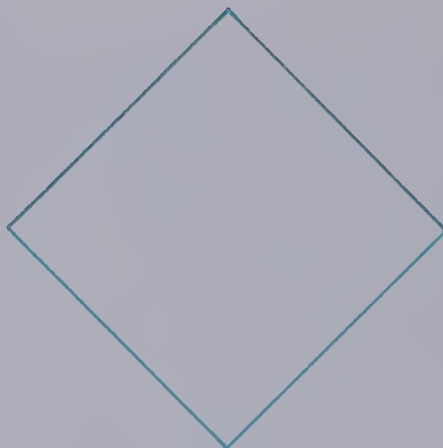
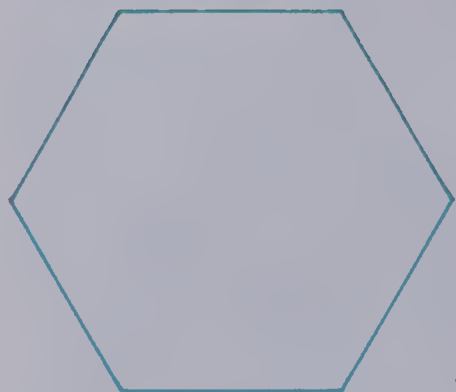
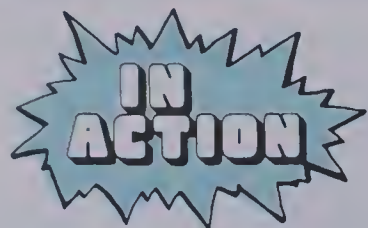
Trace these letters. Use a red plastic mirror to help you draw the lines of symmetry.



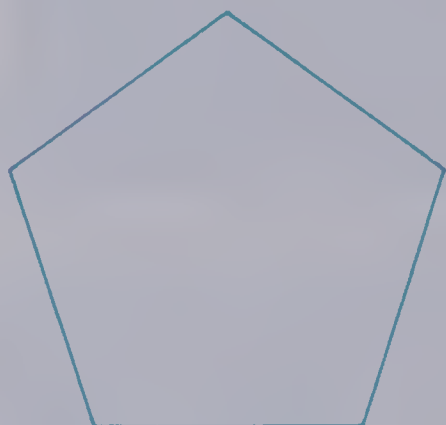
Sometimes shapes have more than 1 line of symmetry.



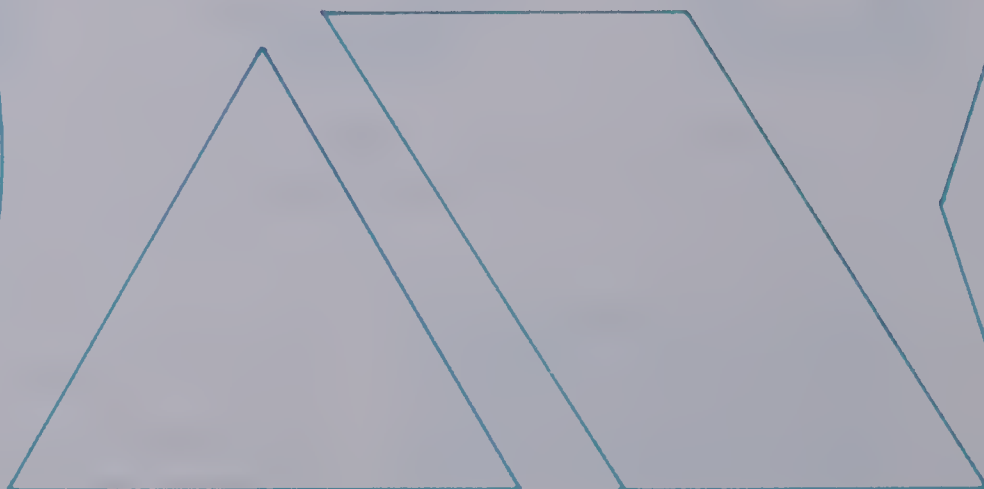
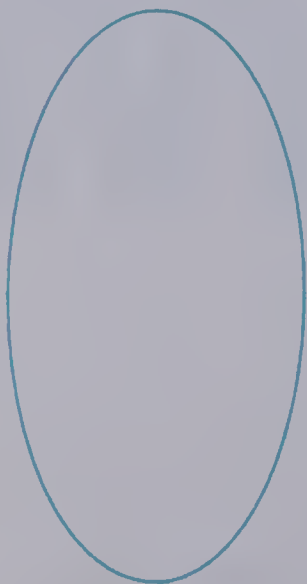
Draw a figure that has
a) 1 line of symmetry
b) more than 1 line of symmetry.



1. From this set of figures pick 1 that has:
- a) exactly 1 line of symmetry
 - b) exactly 5 lines of symmetry
 - c) exactly 4 lines of symmetry
 - d) exactly 2 lines of symmetry
 - e) 0 lines of symmetry
 - f) an infinite number of lines of symmetry
 - g) exactly 3 lines of symmetry
 - h) exactly 6 lines of symmetry



Name the figure that has not been used in the question.

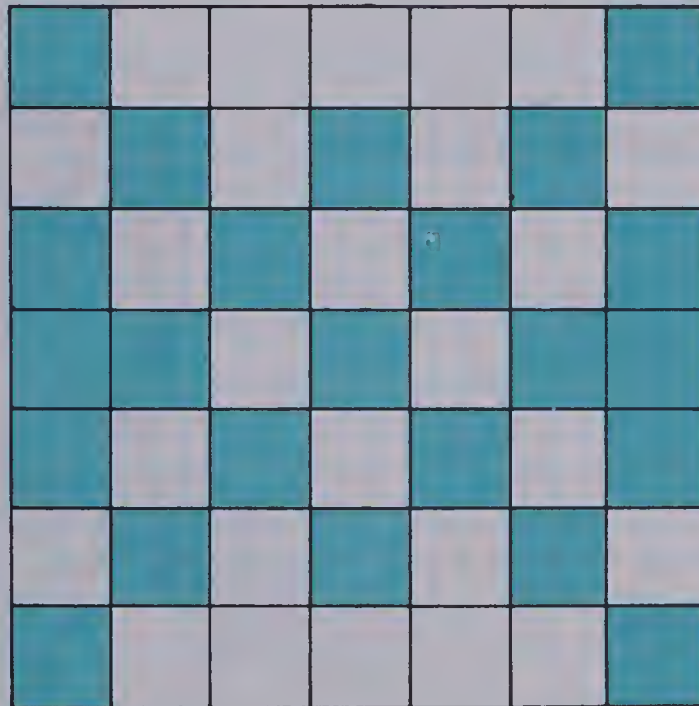




2. Which numerals have:

- a) 1 line of symmetry? b) more than 1 line of symmetry? c) 0 lines of symmetry?

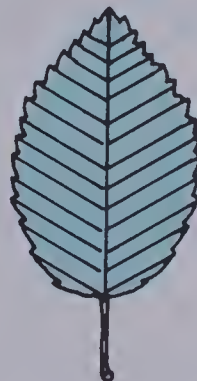
1 2 3 4 5 6 7 8 9 0



3. Use 1 cm graph paper. Create some designs that have 1 or more lines of symmetry.

Make a display of the class work.

4. a) Make a list of items you use every day that have 1 or more lines of symmetry.
b) Make a list of objects found in nature that have 1 or more lines of symmetry.



5. Print the letters of the alphabet in capital form. Sketch in the lines of symmetry for each letter. Use this information to discover words with lines of symmetry.

Rotational Symmetry

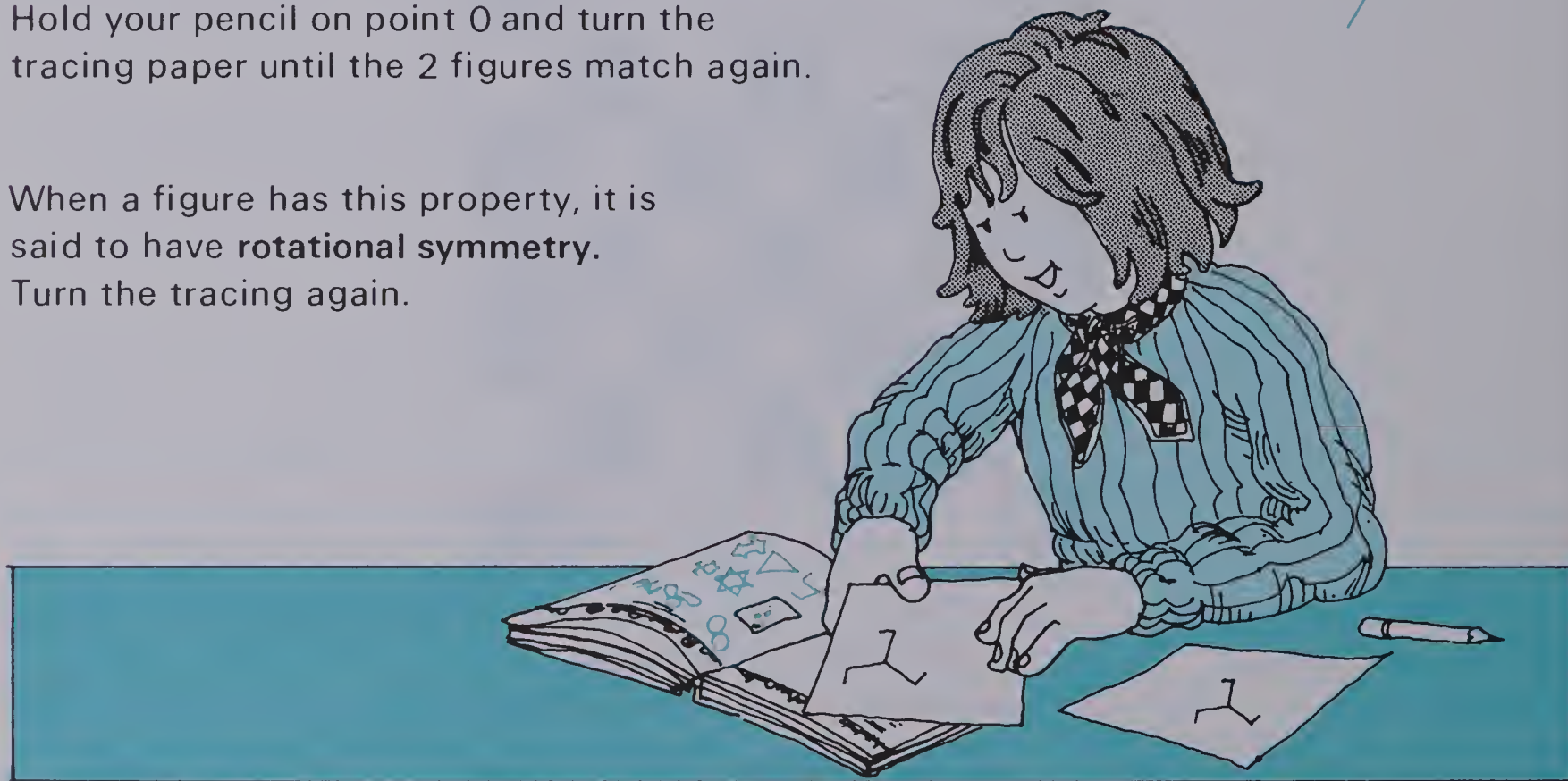
We have looked at line symmetry.

Here is another kind of symmetry.

Trace this figure in your workbook.
Make a second tracing of it on tracing paper.
Place the tracing over the figure
in your workbook so that
the 2 figures match exactly.

Hold your pencil on point 0 and turn the
tracing paper until the 2 figures match again.

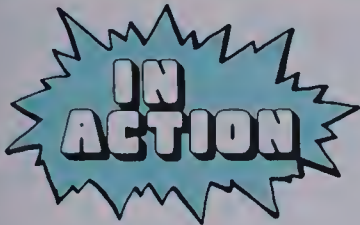
When a figure has this property, it is
said to have **rotational symmetry**.
Turn the tracing again.



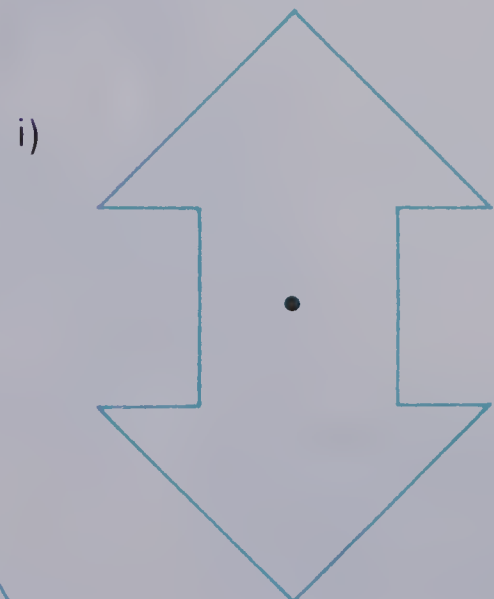
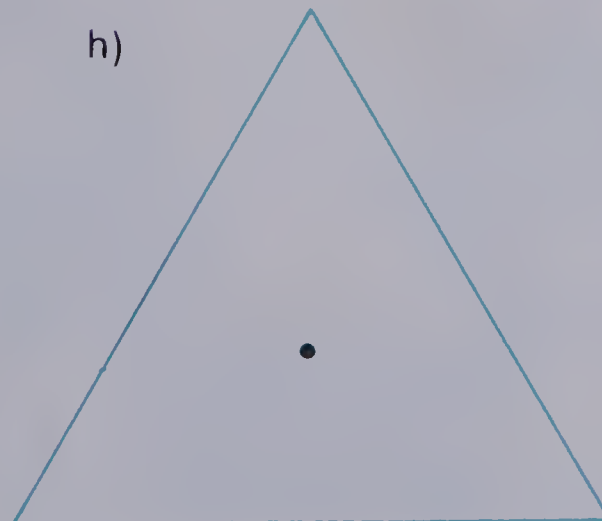
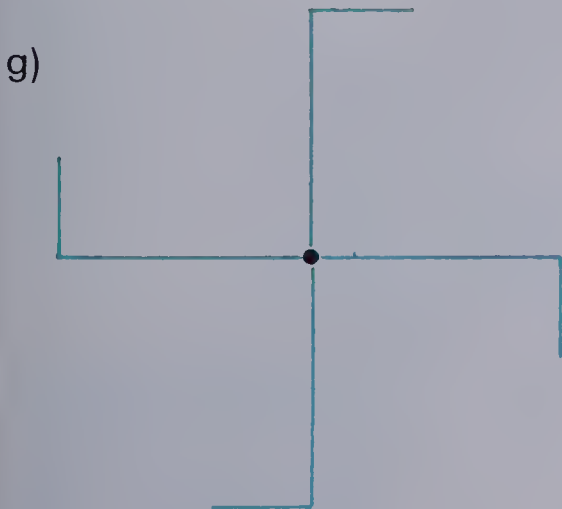
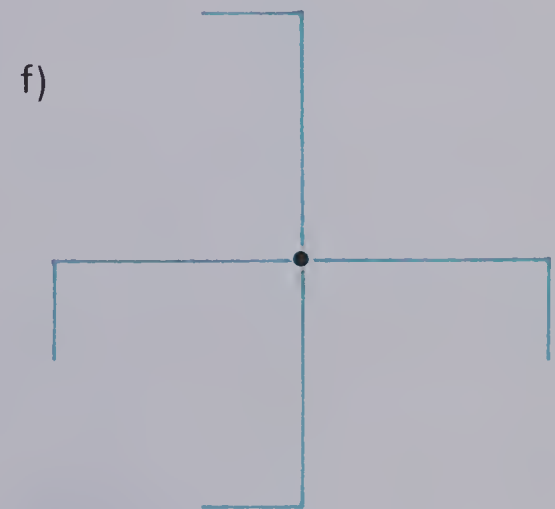
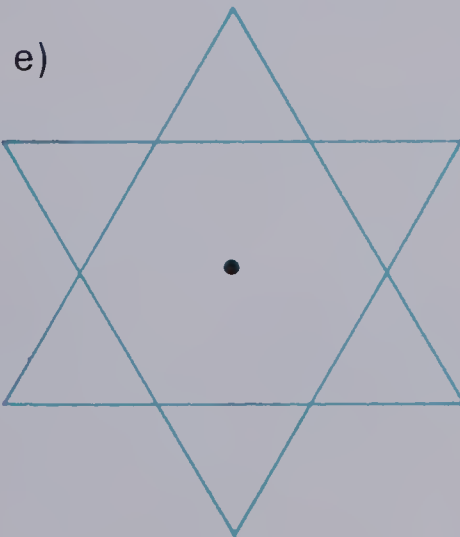
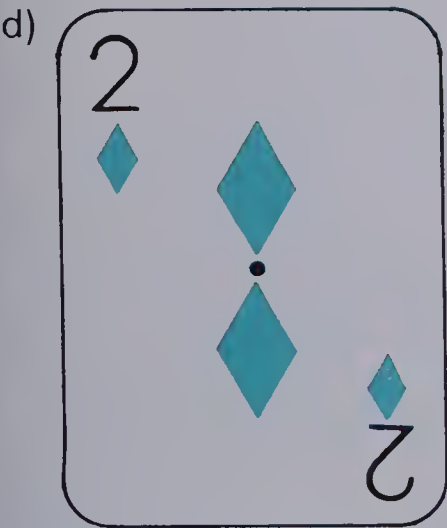
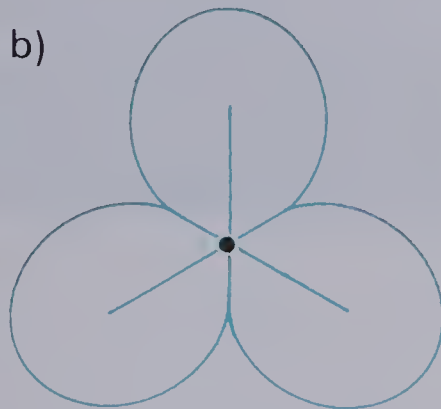
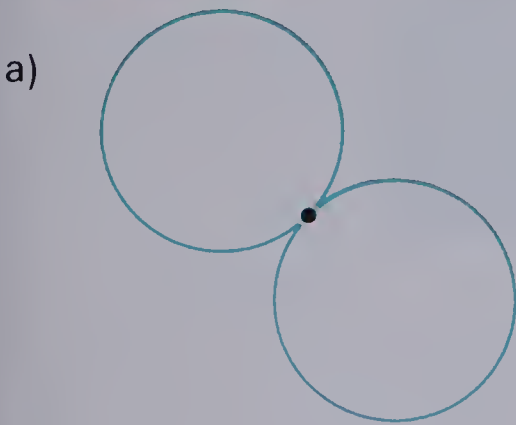
Can you make the 2 figures match
a second time? a third time?

Use tracing paper to test this figure
for rotational symmetry.





1. Use tracing paper to test each of these figures for rotational symmetry.

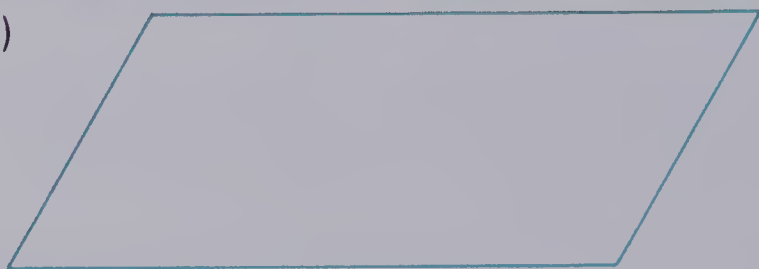




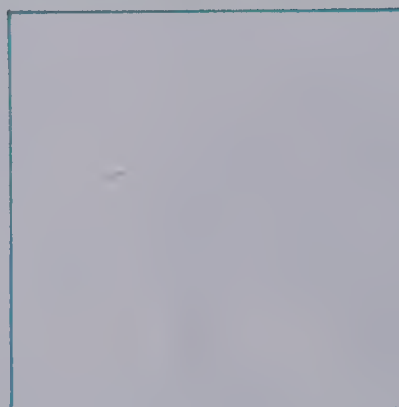
2. Copy and complete the chart.
Use tracing paper to check each figure.

Shape	Rotational symmetry	No rotational symmetry
rectangle	✓	

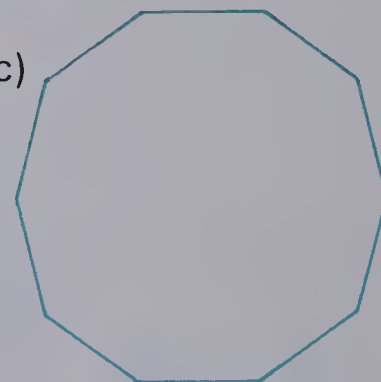
a)



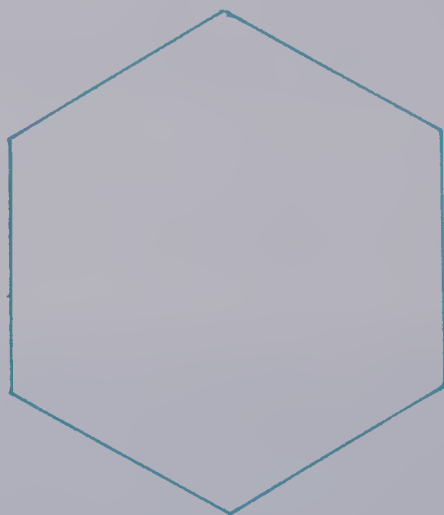
b)



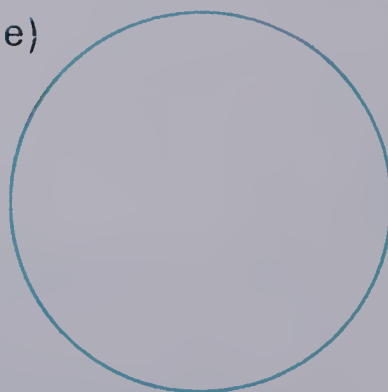
c)



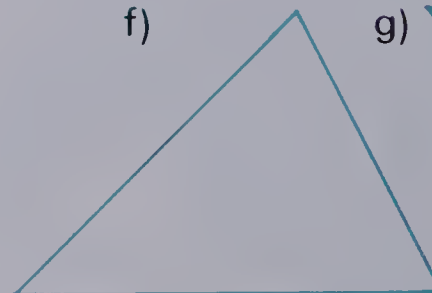
d)



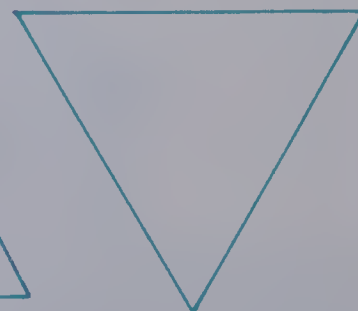
e)



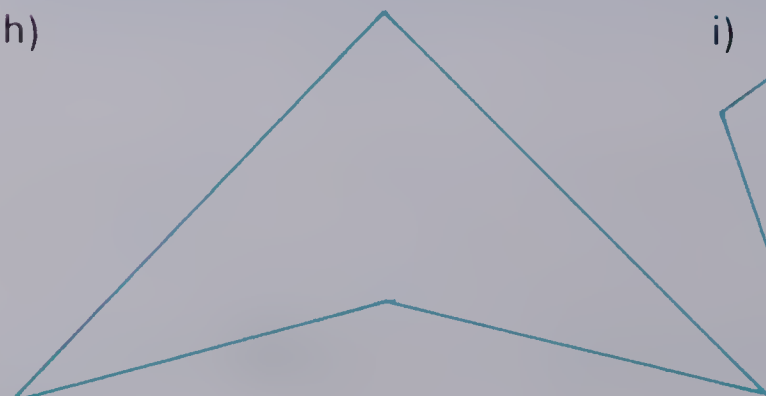
f)



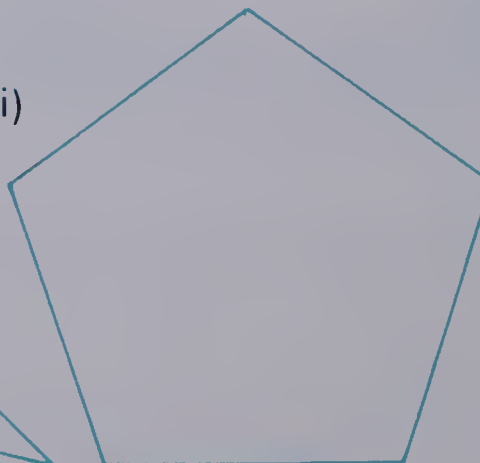
g)



h)



i)



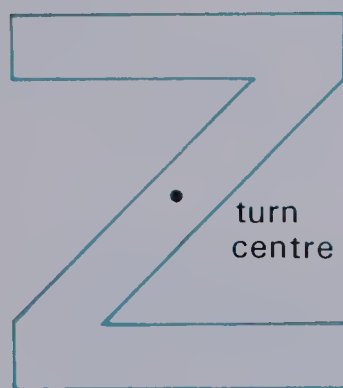
j)





Rotational Symmetry

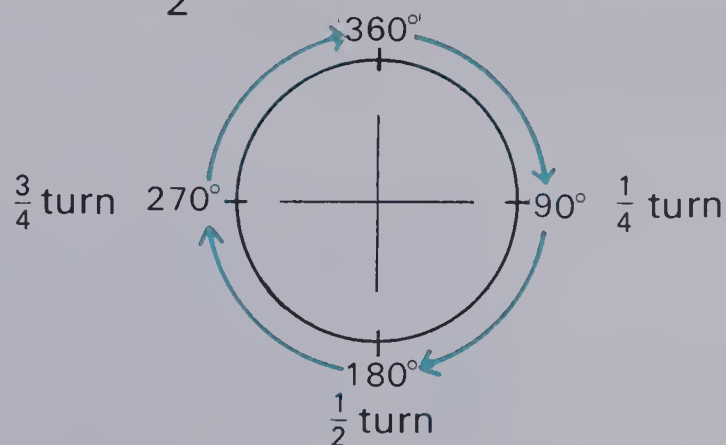
The letter Z does not have line symmetry. Check by using a red plastic mirror. It does appear to have a symmetry of some kind. Copy the diagram. Make a tracing of it on tracing paper. Place the tracing on your copy of the letter.



Rotate the tracing another $\frac{1}{2}$ turn clockwise. Through how many degrees did you rotate the tracing to complete the full turn (two $\frac{1}{2}$ turns)? Because the

Hold your pencil on the turn centre and turn your tracing $\frac{1}{2}$ turn clockwise.

Through how many degrees did you rotate the tracing to get to this position? What do you notice about the tracing and the original letter when you have made the $\frac{1}{2}$ turn?



tracing fits on the original letter 2 ways, we say the letter Z has **rotational symmetry of order 2**.





Trace the letter S on tracing paper.

Rotate the tracing of the letter about the turn centre.

Through how many degrees must you rotate the tracing before the tracing fits on the original letter?

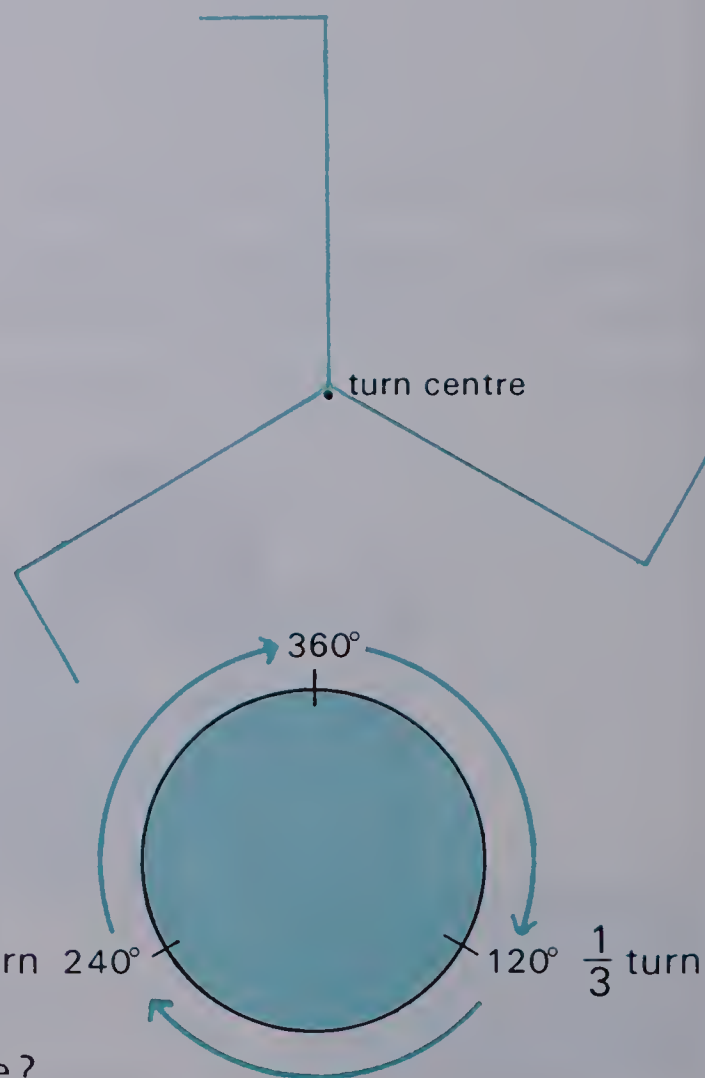
Why do we say that the letter S has rotational symmetry of the order 2?



Trace this figure.

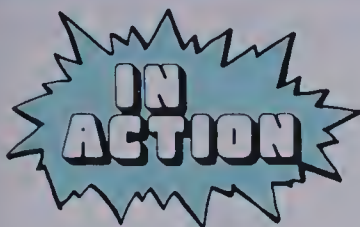
Rotate the tracing about the turn centre.

Through how many degrees must you rotate the tracing before the tracing fits on the original diagram?

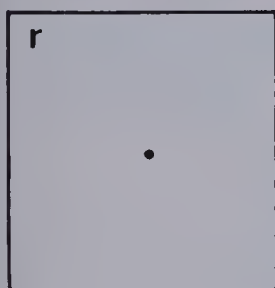


How many times does the tracing fit over the diagram in one complete rotation (360°)?

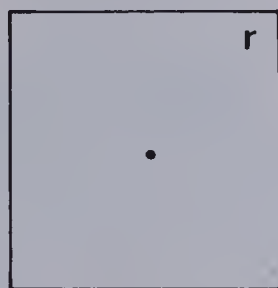
What is the order of rotational symmetry of the figure?



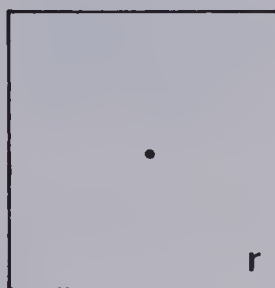
1. The small letter r is not part of the original figure. It is a marker used to help you discover the order of rotational symmetry.



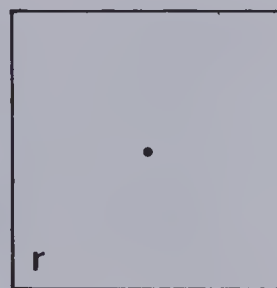
position 1



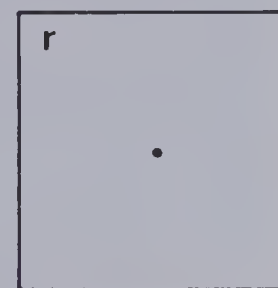
position 2



position 3



position 4

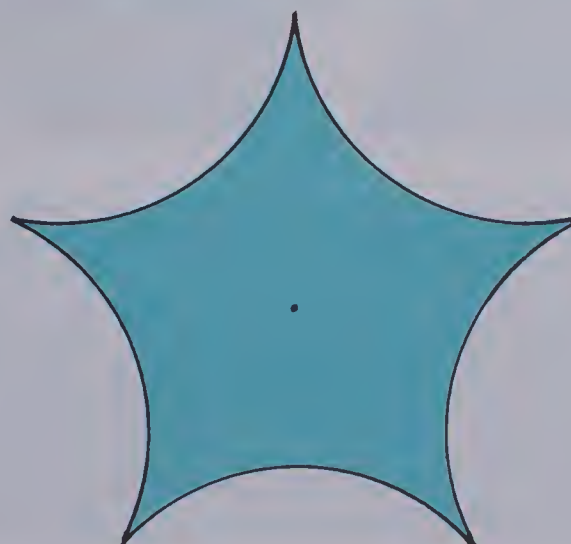


position 5

Copy the chart and complete.

Motion	Rotation	Angle of rotation
Position 1 to position 2	$\frac{1}{4}$ turn	90°
1 to 3		
1 to 4		
1 to 5		
3 to 4		
2 to 5		
2 to 3		
3 to 5		

2. a) What is the order of rotational symmetry of this shape?
Use tracing paper to help you decide.
- b) Through how many degrees (angle of rotation) do you turn the tracing of the shape each time?

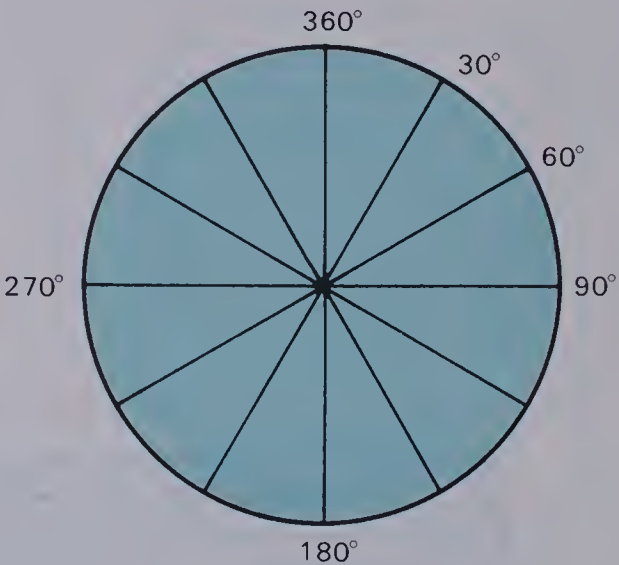




3. a) Copy and complete.

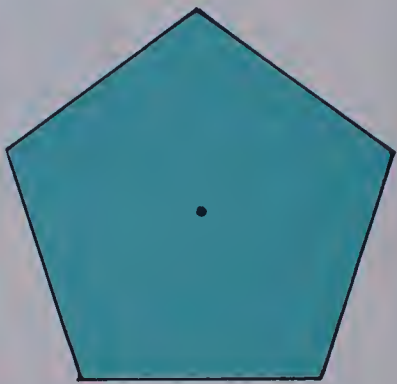
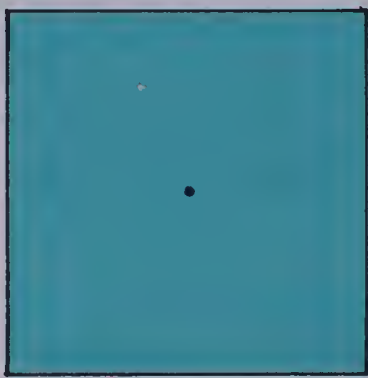
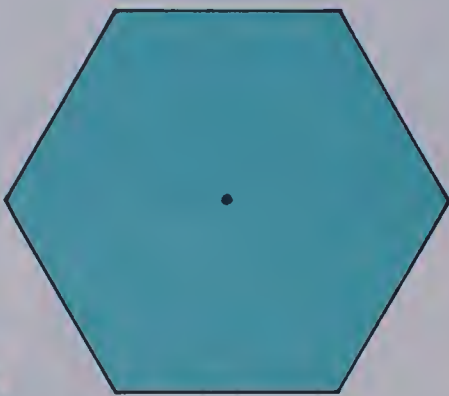
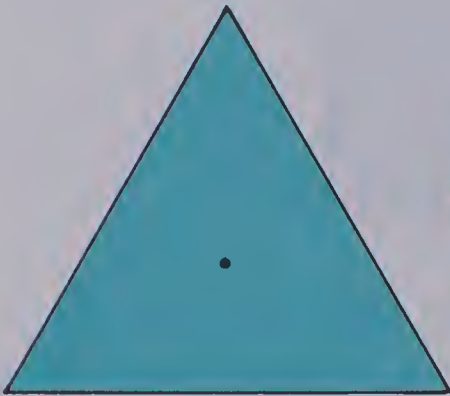
Order of rotational symmetry	Angle of rotation
4	90°
2	
5	
3	
12	
6	

b) If you know the order of rotational symmetry for a shape, how do you discover the angle of rotation?



4. Copy the chart.

Make tracings of each of these shapes.
Use the tracings to help you complete your chart.

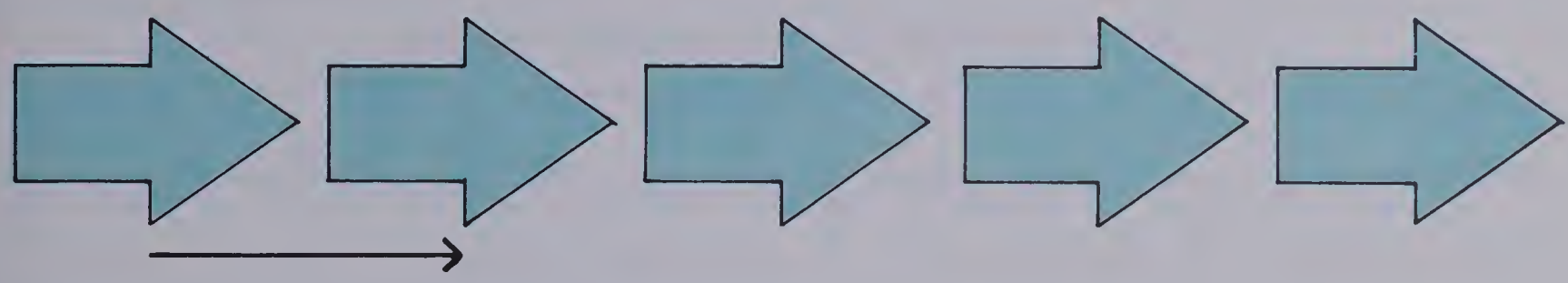


Name of polygon	Angle of rotation	Order of rotational symmetry

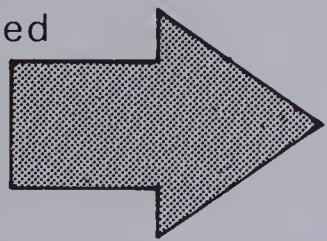


MOTION GEOMETRY/Slides

We can create a pattern by sliding a shape.



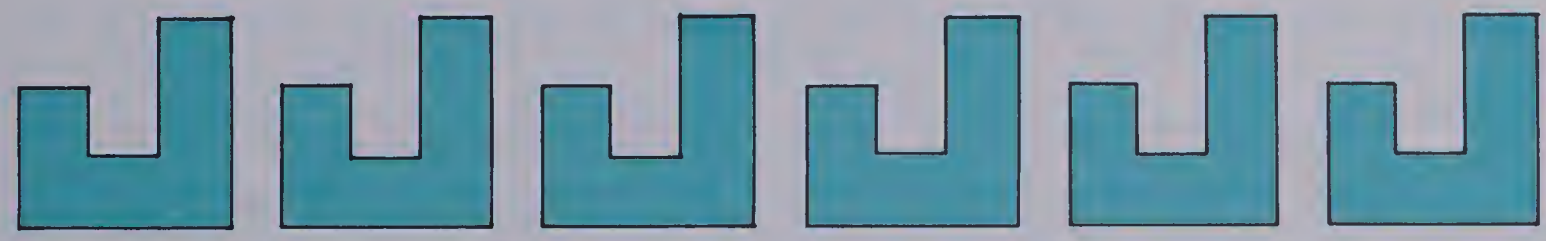
This is the basic shape used to make the pattern.



This is the **slide arrow**.
It gives the distance and the direction of the slide.



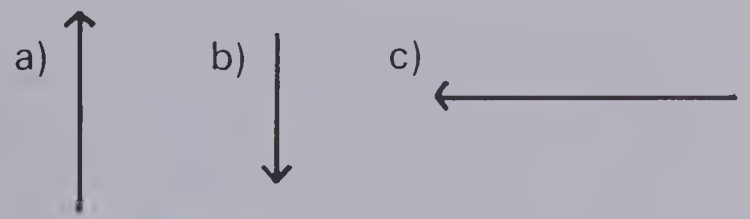
Trace the basic shape used to make this pattern.



This is the slide arrow used.
It gives the distance and direction to move the basic shape 26 mm to the right.

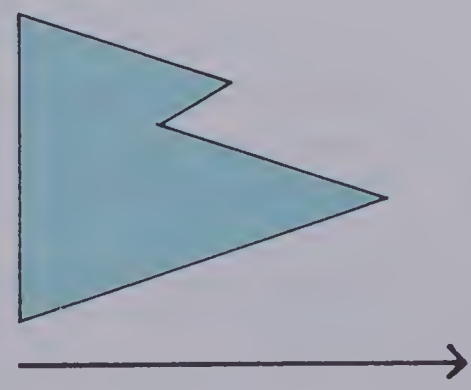


Tell what distance and direction each of these slide arrows indicates.



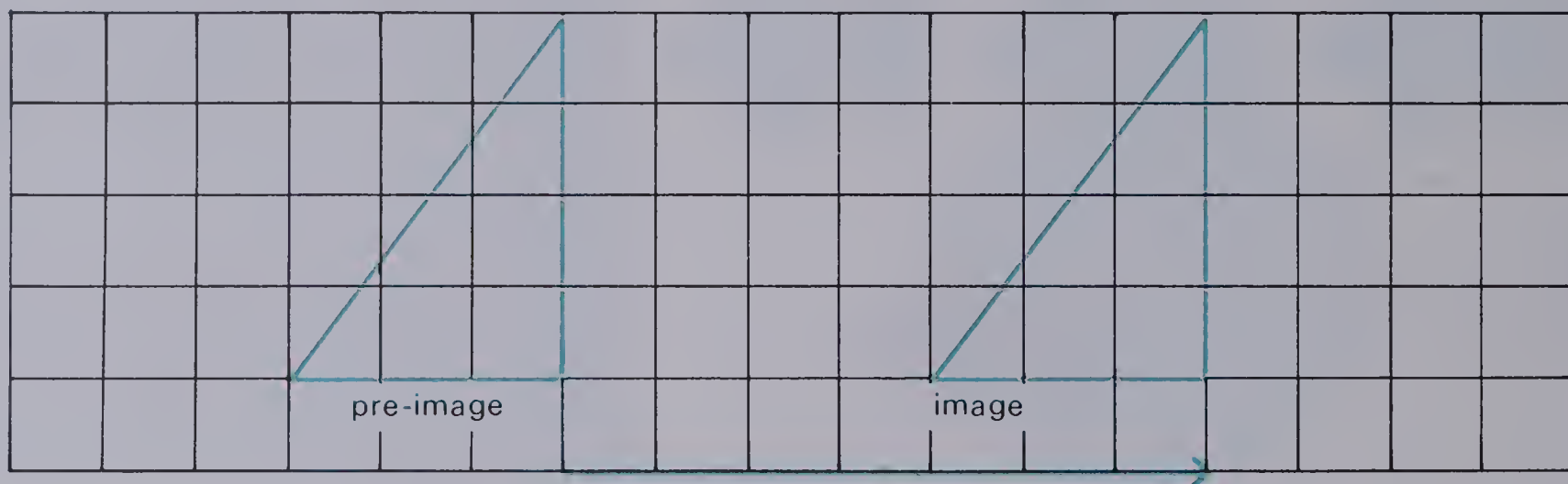
Trace and cut out this shape.
Place it on your workbook page and draw around it.
Measure the length of the slide arrow.

Slide the shape the direction and distance indicated by the slide arrow.
Draw around the shape.
Keep sliding and drawing until you have formed a pattern.





When you slide a shape to a new position and draw around it, the original figure is the pre-image and the tracing is the image.
Graph or dot paper is useful for showing slides.



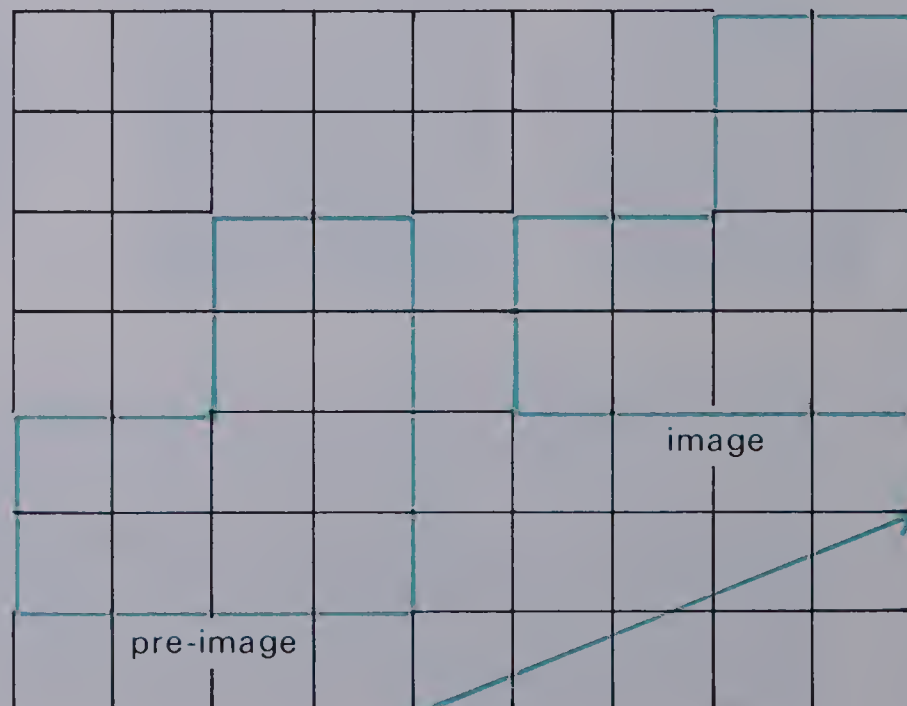
The slide arrow indicates a slide of 7 units (distance) to the right (direction).

Note: The beginning and end points of the slide arrow are corresponding points in the pre-image and the image.

Look at this example.

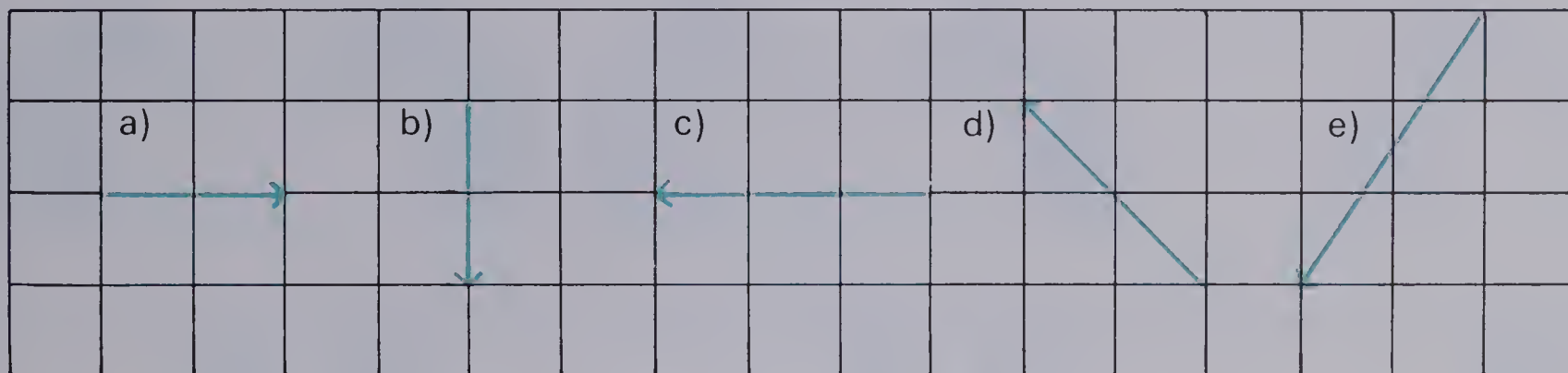
Remember that the slide arrow tells the distance and the direction.

Describe the distance and direction (the slide) that will take the pre-image onto the image.

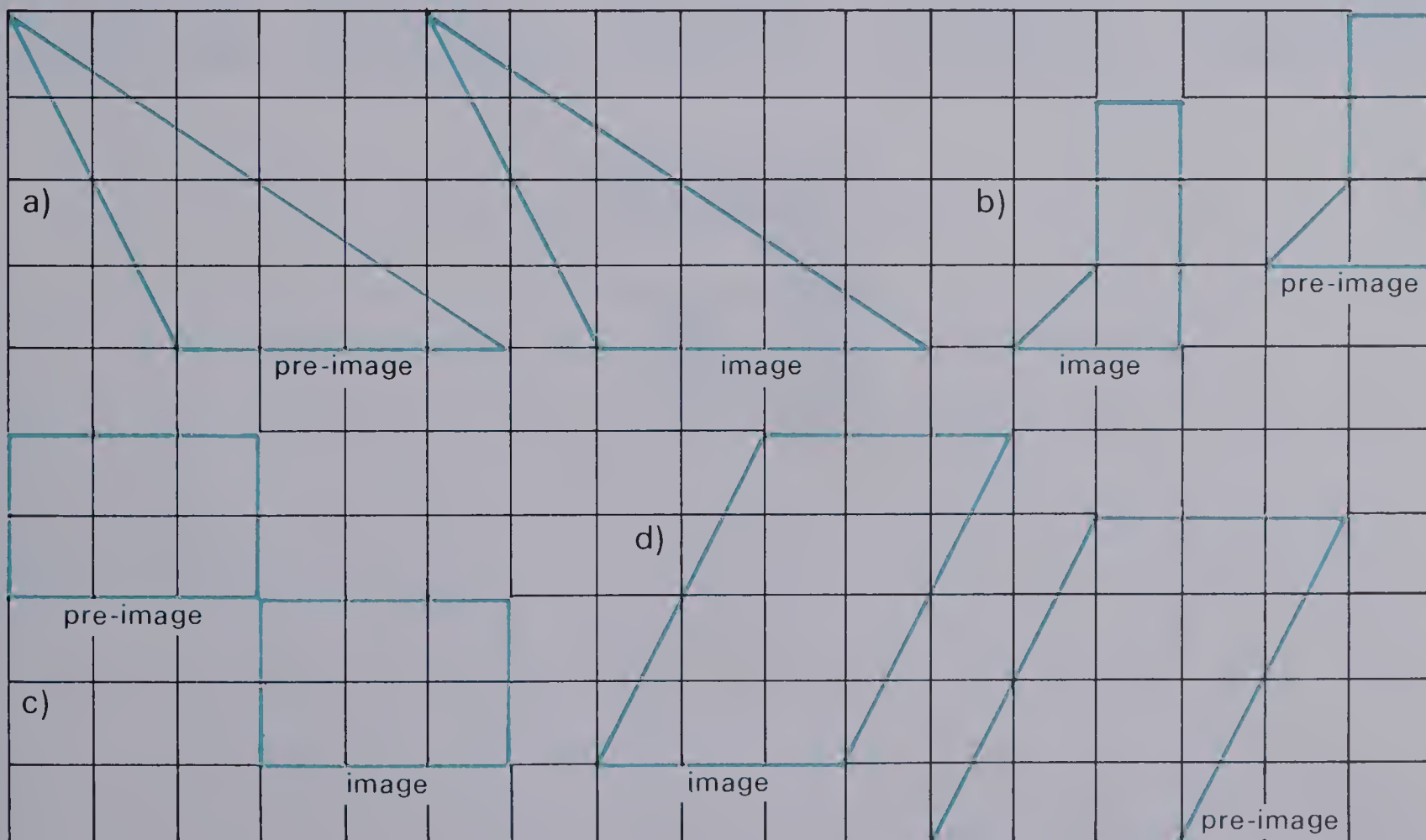




1. Describe the information given by each slide arrow.

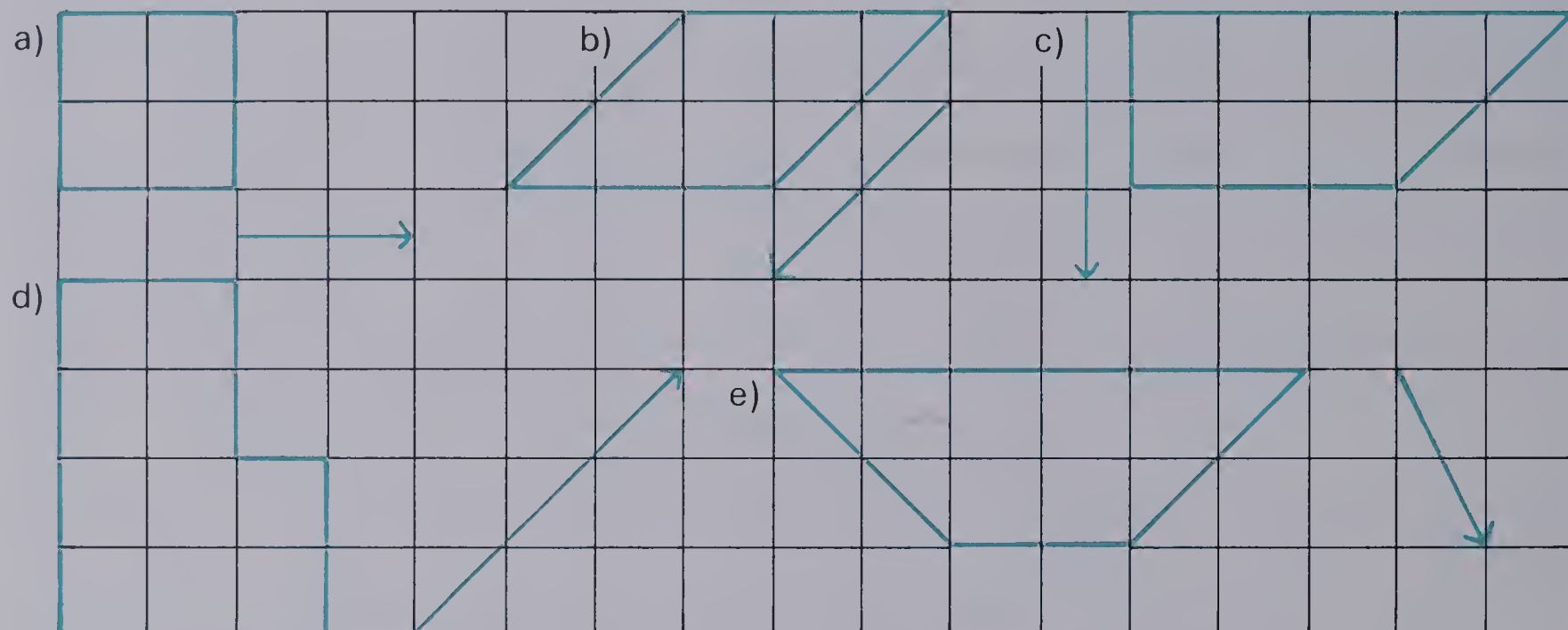


2. Copy each pre-image and image.
Draw and name the slide arrow.

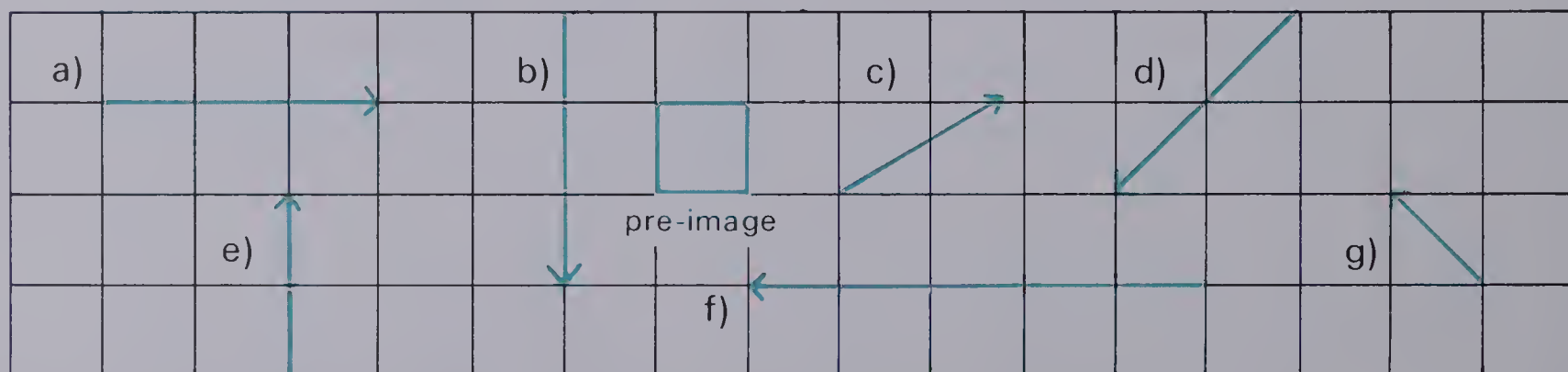




3. Copy each pre-image. Draw the image of each figure for the slide arrow given.
Use graph paper.



4. Draw the image of the pre-image for each slide arrow given.
Use graph paper.



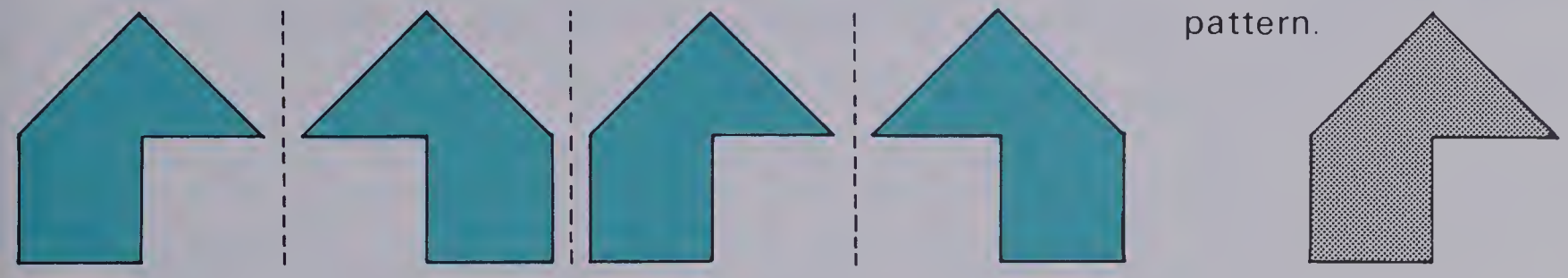
5. a) Draw a figure on graph paper.
b) Draw 3 different slide arrows.
c) Draw the image of the pre-image for each slide arrow.



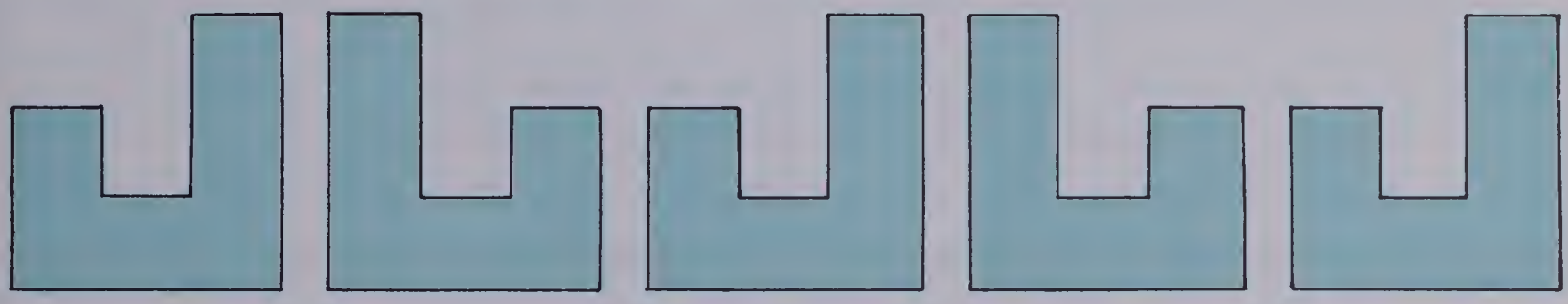
Flips

We can create a pattern this way.
We can "flip" a shape about a **flip line**.

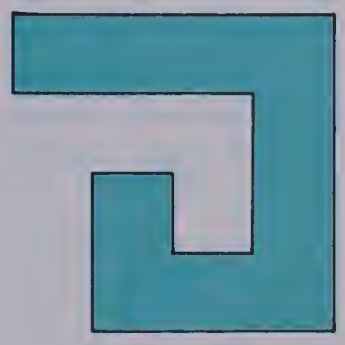
This is the basic shape used to make the pattern.



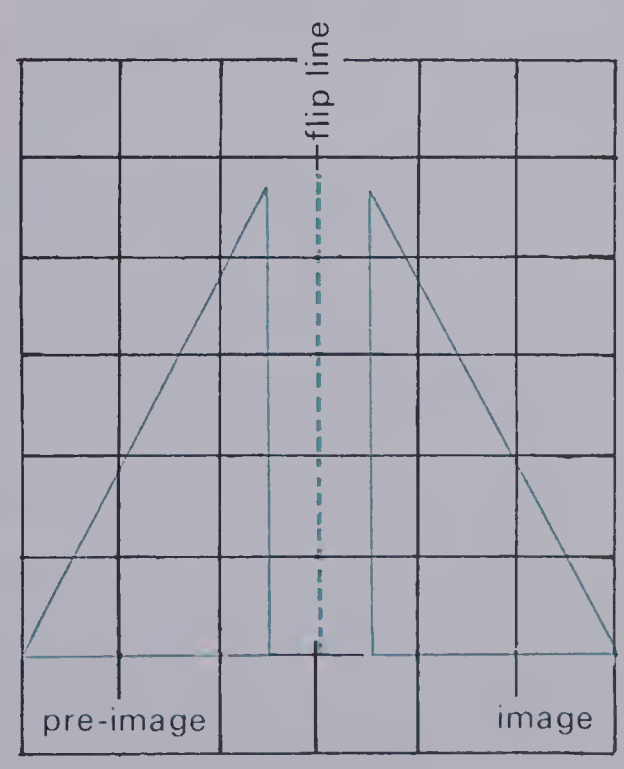
Trace the basic shape used to make this pattern.



Trace and cut out this shape.



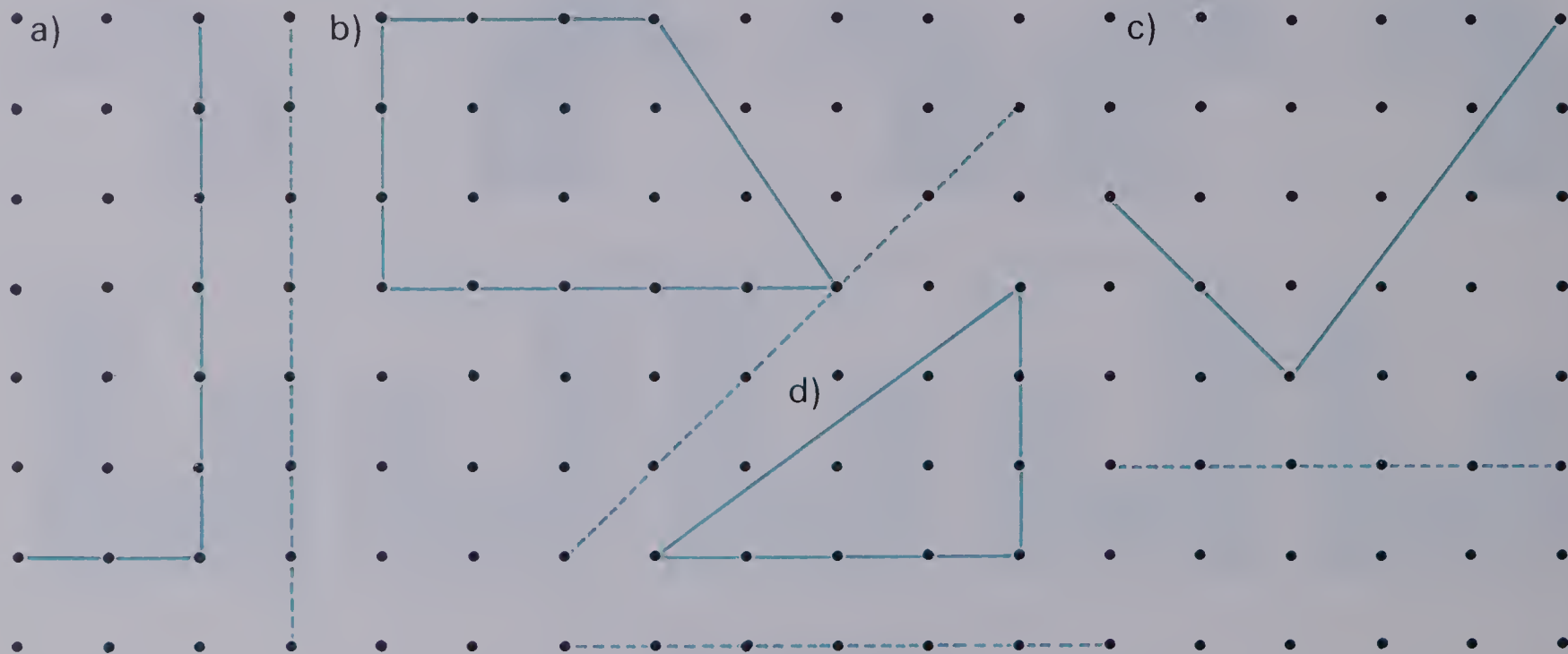
Draw a flip line. Flip your shape about the flip line.
Draw around the shape, flip it again and draw around it.
Continue flipping and drawing until you have formed a pattern.
When you flip a shape to a new position and draw around it, the original figure is the pre-image and the new figure is the image.
Graph or dot paper is useful for showing flips.
Draw a shape on graph paper and draw a flip line. Now draw the image of the pre-image.





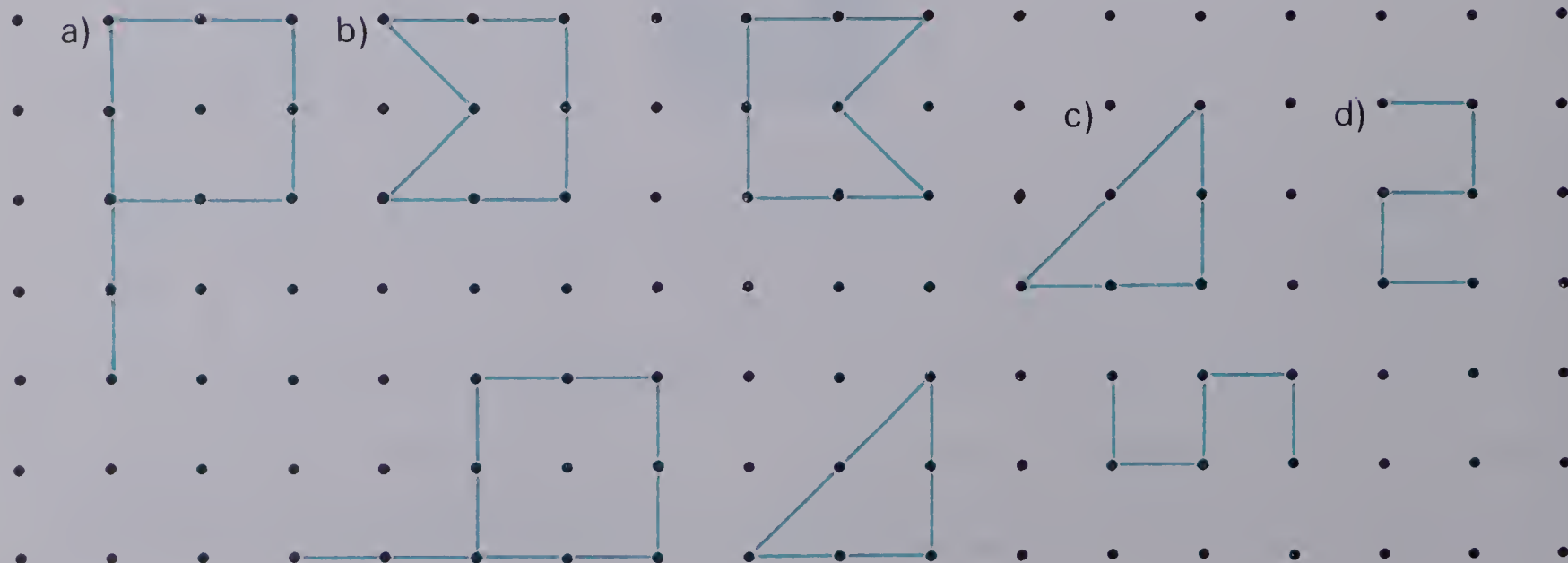
1. Copy each figure onto dot paper.

Draw the image of each pre-image about the suggested flip line.



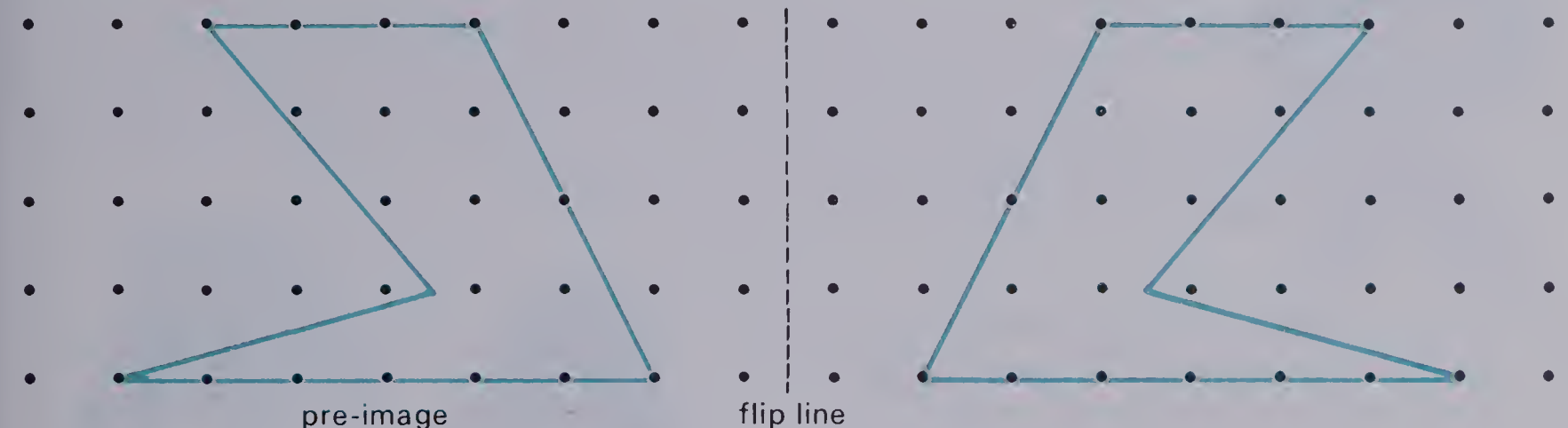
2. Copy each pre-image and image onto dot paper.

Draw the "flip" line for each pair.





Flipping About a Line/Reflection in a Line



Flip this figure about the flip line.

This is the image of the pre-image.

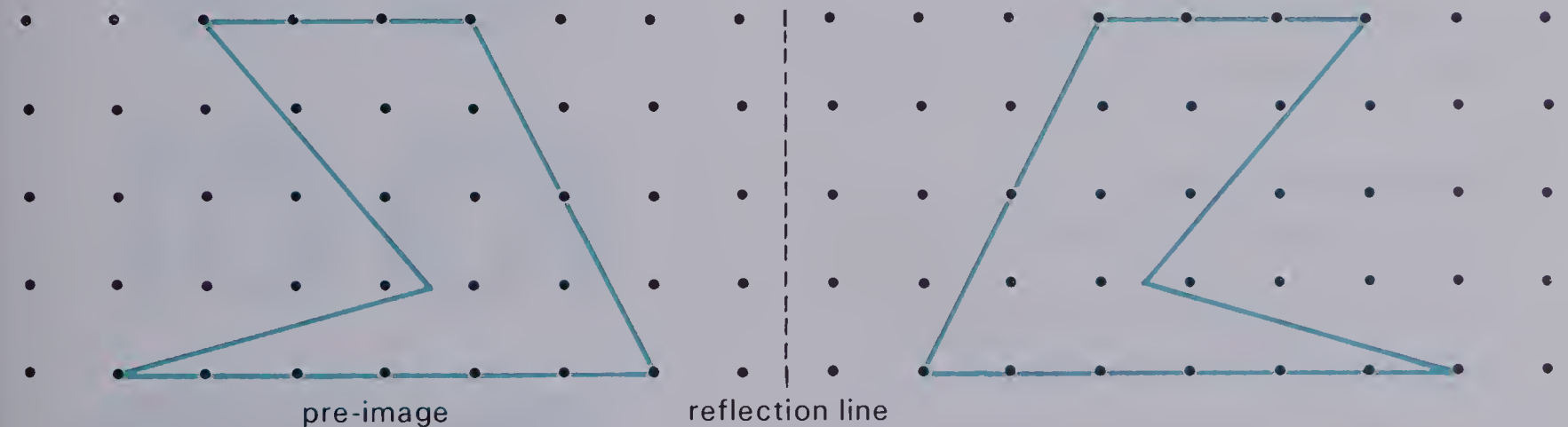
Stand a red plastic mirror on the flip line.

Look at the pre-image through the plastic mirror and draw the image.

If you use an ordinary mirror you will see the reflection,
but you will not be able to draw the image at the same time.

Copy the pre-image and the reflection line.

Draw the image for the pre-image.



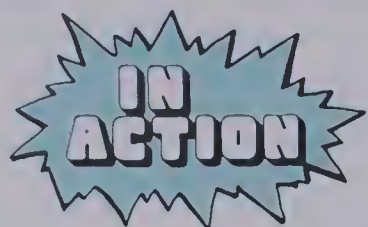
Think about the reflection (image).

Is it congruent to the pre-image?

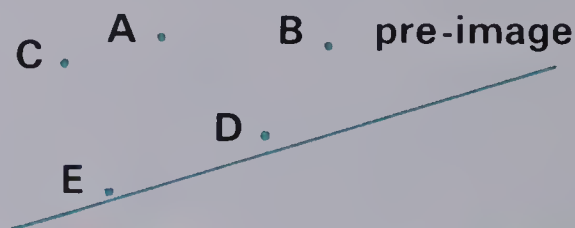
Name the pre-image ABCDE clockwise starting at the upper left.

Use A'B'C'D'E' (A' is read "A prime") for the corresponding points in the image.

How is the position of A'B'C'D'E' related to the position of ABCDE?



1. Copy this diagram on dot paper.
Draw the images of A, B, C, D, and E.



2. Use each letter of the alphabet as a pre-image. Draw a reflection line for each pre-image. Draw the image. Use dot paper or a red plastic mirror to help you.



3. What is the secret message?

This is a reflected image.

4. Create an interesting shape on dot paper. Draw a flip line and the mirror image.

5. What do you notice when you see this numeral reflected in a mirror?
Can you form another numeral that will reflect the same way?



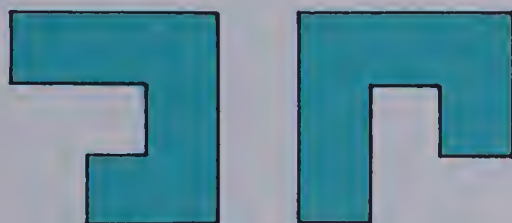
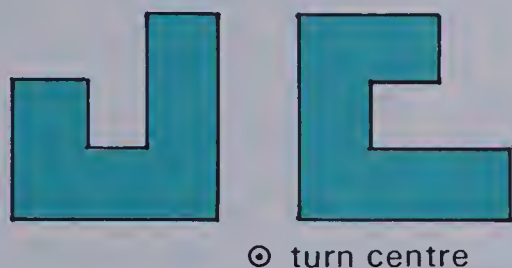
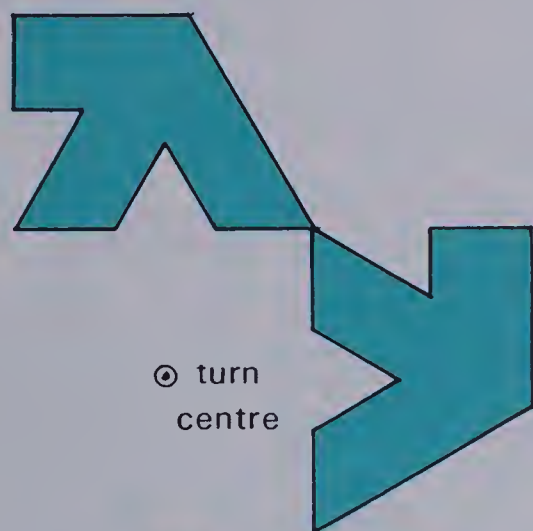
6. Use this word for the pre-image. Draw the image by using
a) a horizontal reflection line
b) a vertical reflection line.
Can you discover another word that reflects like this one?





Turns

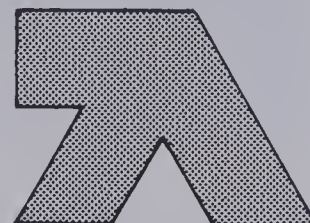
We can create a pattern this way.
We can turn a shape about a **turn centre** and trace it.



⊙ turn centre

This is the basic shape used to make the pattern.

The shape is turned about a turn centre.



This shape has been turned $\frac{1}{4}$ turn clockwise.

What is the **angle of rotation**?

Trace the basic shape used to make this pattern.

List the angles through which the shape was turned to make the pattern.

When you turn a shape about a point to a new position and draw around it, the original figure is the pre-image and the new figure is the image.

Trace and cut out this basic shape.

Trace the shape on a piece of paper and locate the turn centre.

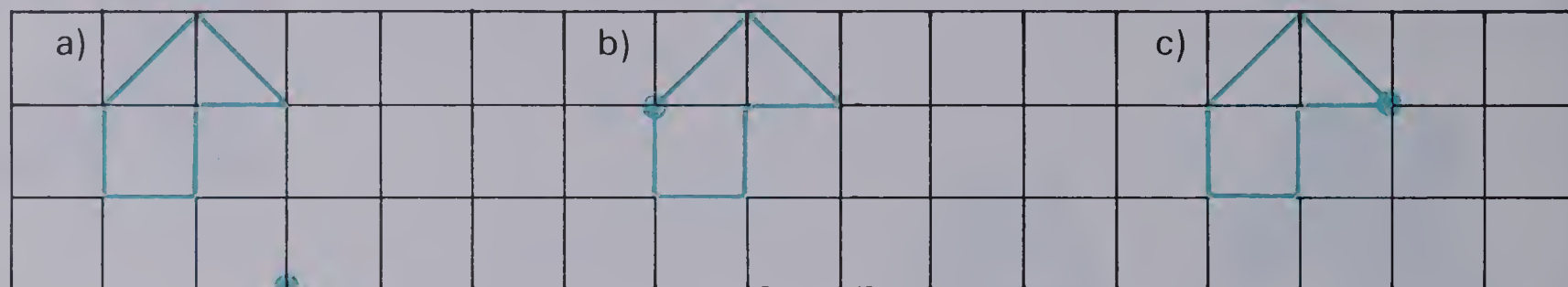
Rotate the shape through 90° .

Trace the shape to find the image of the pre-image.

Repeat this procedure for a rotation of 180° and for a rotation of 270° .



- Copy each of the figures on dot paper.
Draw the turn image for each pre-image.



90° clockwise

180° counter-clockwise

90° clockwise

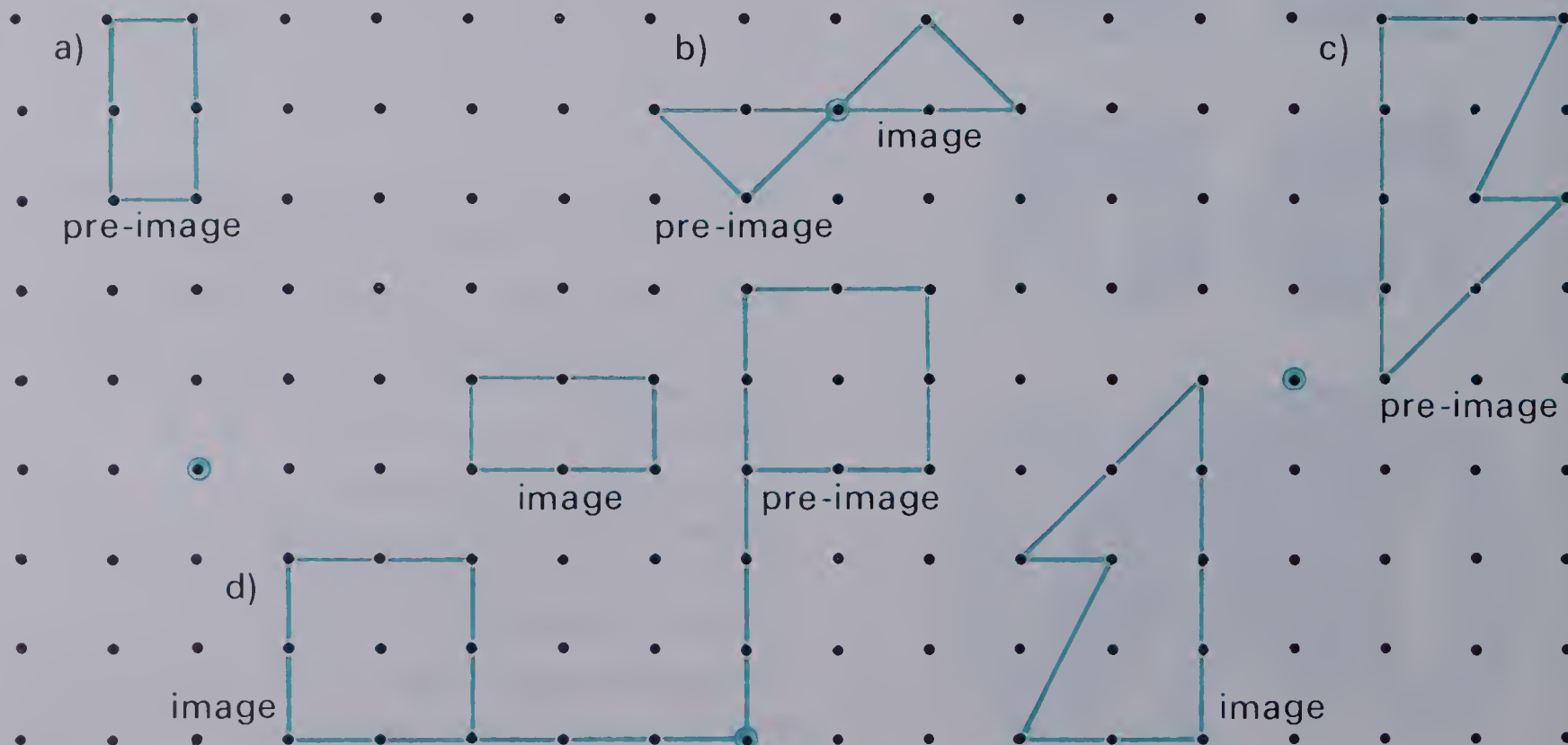


90° counter-clockwise

270° clockwise

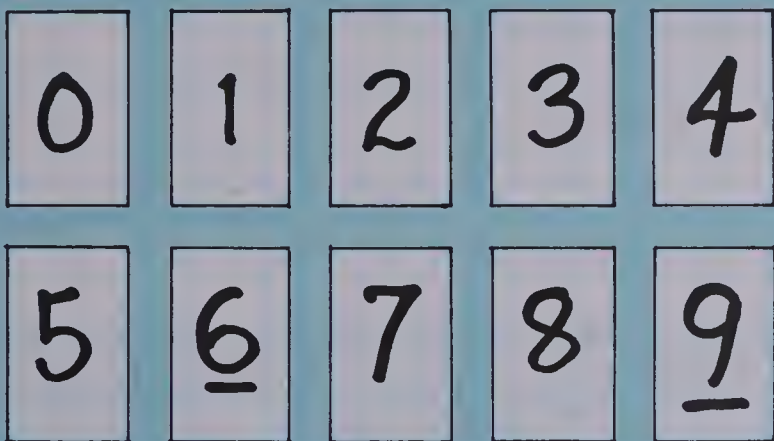
180° counter-clockwise

- Tell the angle of rotation and the direction that would turn the pre-image onto the image.

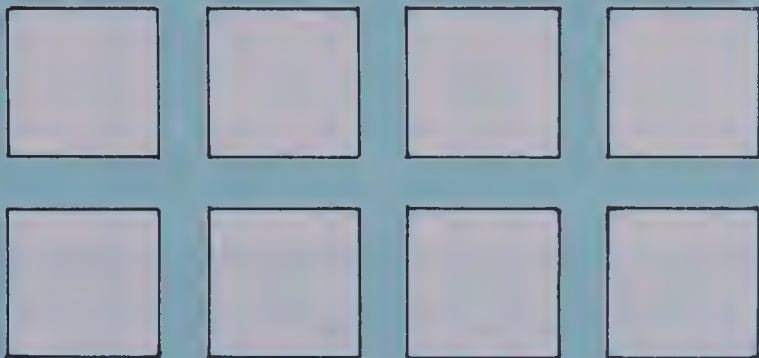


Greatest Difference (3 to 6 players)

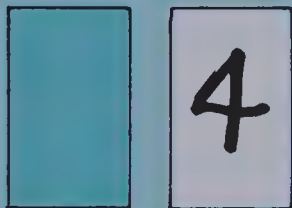
A Make a deck of cards like this.



B Each player makes a gameboard like this.



C Shuffle the cards and place the deck face down.



The Caller draws the top card and places it face up beside the deck.

D

PETER	SONIA	DELIA
	4	4
4		

These players wrote the numeral 4 in these places.

E One at a time, 7 more cards were drawn. The players filled in their gameboards and completed the subtraction.

PETER	SONIA	DELIA
9 0 5 6	9 4 0 6	9 7 4 5
7 8 3 4	8 5 7 3	6 8 0 3
?	?	?

Who had the Greatest Difference?

F Play the game yourself.
You may wish to use some of these gameboards.

EXPLORE

PRIME NUMBERS/COMPOSITE NUMBERS

The product of 2 whole numbers is a whole number.

$$\begin{array}{ccc} & 3 \times 4 = 12 & \\ / & | & \backslash \\ \text{factor} & \text{factor} & \text{product} \end{array}$$

Investigate factors of whole numbers.

Number	Factor form	Factors	Number of factors
1	1×1	1	1
2	1×2	1, 2	2
3	1×3	1, 3	2
4	1×4 2×2	1, 2, 4	3
5	1×5	1, 5	2
12	1×12 2×6 3×4	1, 2, 3, 4, 6, 12	6

Make a chart like the one above for the numbers 7, 11, 13, 15, 20, 24.

A number with exactly 2 factors is called a **prime number**.

Look at the charts. List the prime numbers included.

A number with more than 2 factors is called a **composite number**.

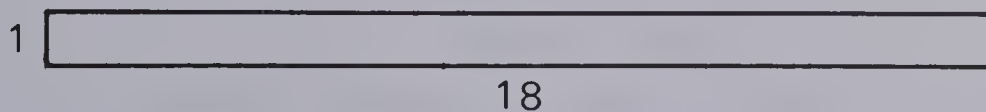
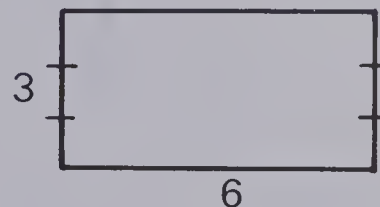
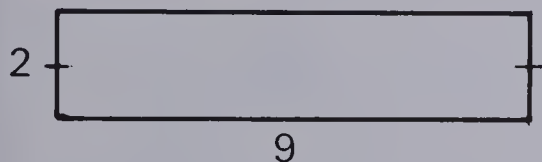
Look at the charts. List the composite numbers included.

1 is considered neither prime nor composite.

What even number is a prime number? Why?



1. A composite number can be illustrated by 2 or more rectangles.
For example, you can illustrate 18 these ways:



- a) Draw rectangles to illustrate 5, 7, 24.
b) How many different rectangles can you draw to illustrate any prime number?

2. List the prime numbers from 2 to 31.

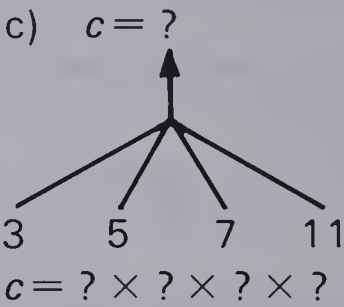
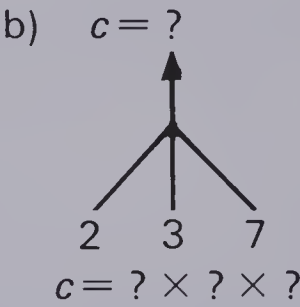
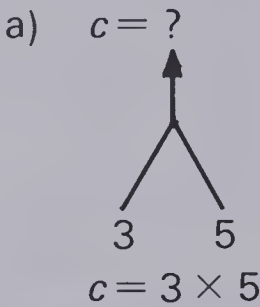
3. Investigate.

Pair of prime numbers	Sum	Kind of number	Difference	Kind of number	Product	Kind of number
(7, 3)	10	even, composite			21	odd, composite
(5, 3)						
(3, 3)						
(9, 7)						
(17, 9)						
(19, 13)						
(23, 7)						

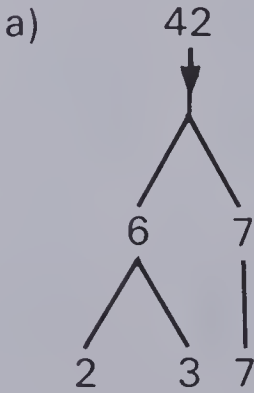


Prime Factorization

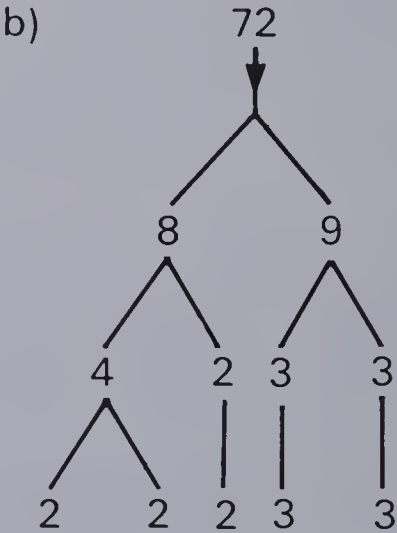
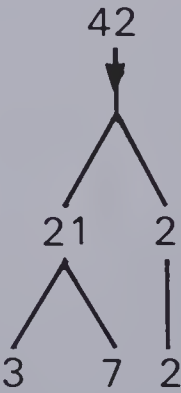
A tree diagram can help generate composite numbers from prime numbers.
If c represents a composite number, find c .



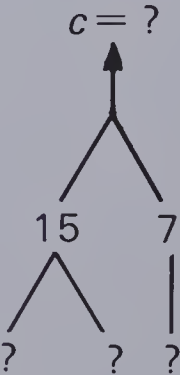
If we start with a composite number
we can use a tree diagram this way to find prime factors.



or



Finding the **prime factorization** of a number means
expressing it as the product of prime factors.
 $42 = 2 \times 3 \times 7$ $72 = 2 \times 2 \times 2 \times 3 \times 3$



For this tree diagram, what is the number?
Show the prime factorization.



1. Find the composite number c for each tree diagram.

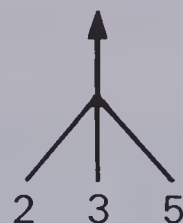
a) $c = ?$



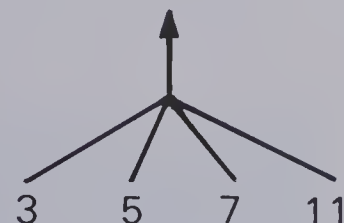
b) $c = ?$



c) $c = ?$

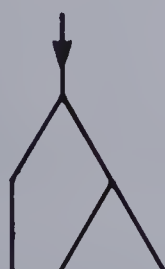


d) $c = ?$

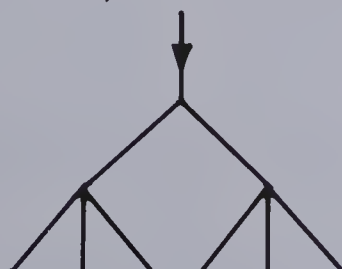


2. Find the prime factorization of each composite number.

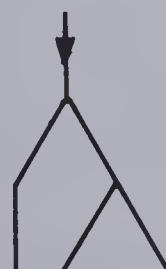
a) 45



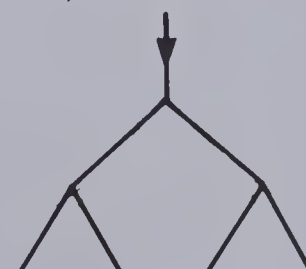
b) 64



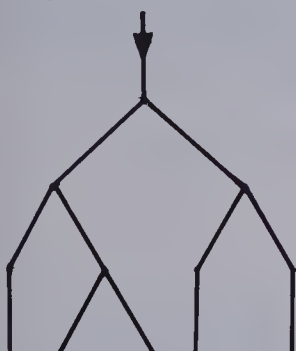
c) 98



d) 100



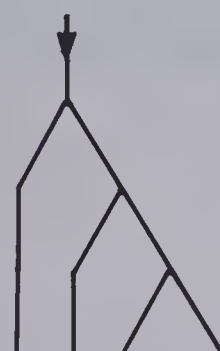
e) 120



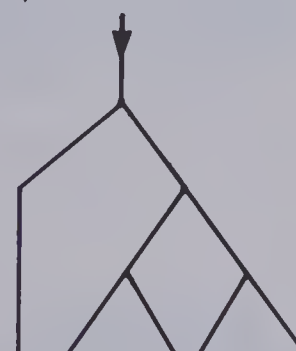
f) 125



g) 156



h) 162



3. Find the prime factorization of each composite number.

a) 16

b) 50

c) 60

d) 75

e) 90

f) 99

g) 105

h) 115

i) 130

j) 142

k) 145

l) 175

m) 190

n) 205



Finding the Factors of a Number

You can find the **set of factors** of a number this way:

- A 1 and the number itself are factors of any number.
- B Try other small numbers as factors.

Find the set of factors of 120.

Test:— Is 120 divisible by k ?

k	Check	Factors
1	$1 \times 120 = 120$	1 120
2	$2 \times 60 = 120$	2 60
3	$3 \times 40 = 120$	3 40
4	$4 \times 30 = 120$	4 30
5	$5 \times 24 = 120$	5 24
6	$6 \times 20 = 120$	6 20
7		
8	$8 \times 15 = 120$	8 15
9		
10	$10 \times 12 = 120$	10 12
11		

The set of factors of 120 is {1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120}.



Find the set of factors of

- | | | | | | | |
|-------|-------|--------|--------|--------|--------|--------|
| a) 12 | b) 21 | c) 23 | d) 36 | e) 48 | f) 56 | g) 75 |
| h) 85 | i) 90 | j) 102 | k) 115 | l) 124 | m) 148 | n) 150 |



GCF/Greatest Common Factor

To find the **greatest common factor** of 2 numbers,
first find the set of factors of each number.

Find the GCF of 24 and 56.

Factors of 24

1	24
2	12
3	8
4	6

The set of factors of 24 is
{1, 2, 3, 4, 6, **8**, 12, 24}.

Factors of 56

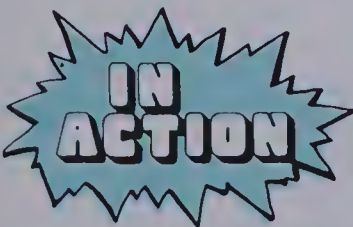
1	56
2	28
4	14
7	8

The set of factors of 56 is
{1, 2, 4, 7, **8**, 14, 28, 56}.

The GCF of 24 and 56 is 8.

To help you find factors

- A If the number is even, 2 is a factor.
- B If the sum of the digits of a number is divisible by 3, 3 is a factor of the number.
Is 168 divisible by 3? Yes, since $1 + 6 + 8$ or 15 is divisible by 3.
- C If the last 2 digits of a number are divisible by 4, 4 is a factor.
Is 528 divisible by 4? Yes, since 28 is divisible by 4.
- D If a number ends in 0 or 5, the number is divisible by 5. 125 is divisible by 5; 490 is divisible by 5.
- E If 2 is a factor and 3 is a factor, 2×3 or 6 is a factor.



1. Find the GCF of
- | | | | | |
|-----------|------------|-----------|------------|-------------|
| a) 12, 18 | b) 20, 50 | c) 48, 72 | d) 75, 90 | e) 96, 128 |
| f) 32, 80 | g) 70, 126 | h) 54, 90 | i) 84, 105 | j) 150, 210 |

Retrace Your Steps

1. Complete the chart.

Number	Factor forms	Factors	Number of factors
5	1×5	1, 5	2
8			
10			
13			
15			
18			

2. Write the factor forms for the numbers from 20 to 29.

Name each number "prime" or "composite".

3. Find the composite number for each diagram.

a) $c = ?$



b) $c = ?$



c) $c = ?$



d) $c = ?$



e) $c = ?$

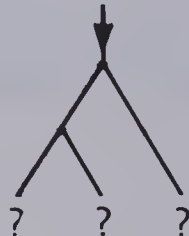


4. Find the prime factorization of each number.

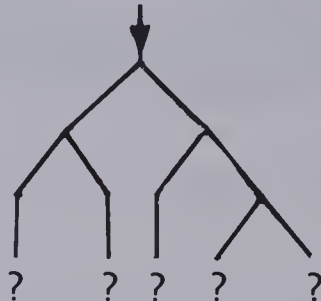
a) 38



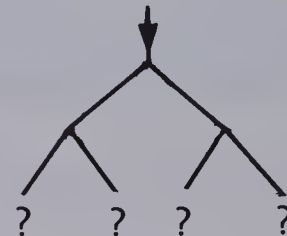
b) 42



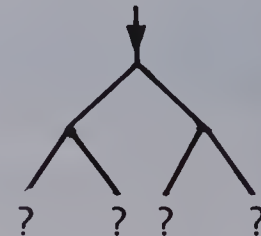
c) 48



d) 90



e) 132



5. Find the prime factorization of each number.

a) 10

b) 17

c) 22

d) 37

e) 52

f) 60

g) 77

h) 91

i) 99

6. Write the set of factors for each number.

a) 7

b) 15

c) 25

d) 31

e) 42

f) 78

g) 112

h) 130

i) 142

7. Find the GCF of

a) 4, 5

b) 8, 12

c) 24, 36

d) 60, 75

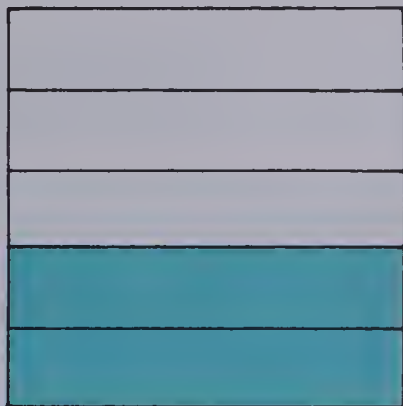
e) 35, 70

f) 56, 72

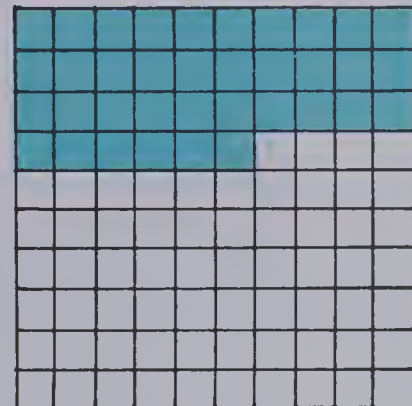
EXPLORE

FRACTIONS/A Number of Equal Parts

1 square
5 equal parts
Each part shows $\frac{1}{5}$
The shaded part
shows $\frac{2}{5}$

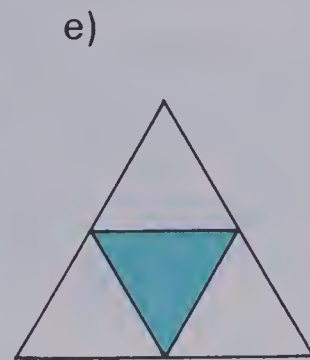
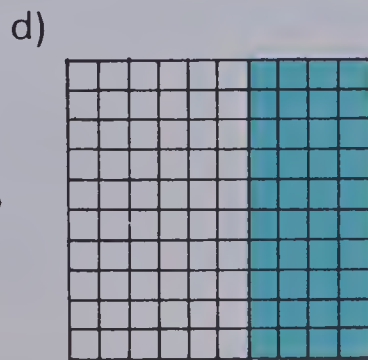
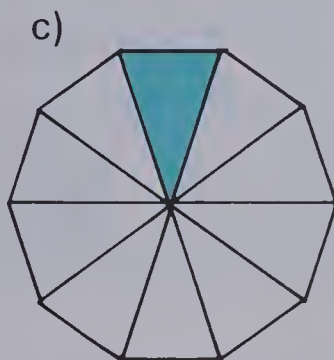
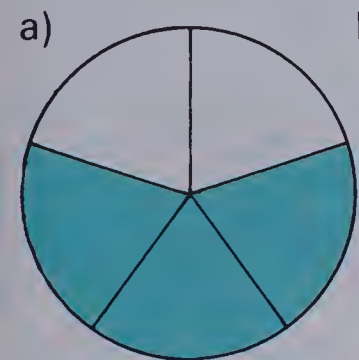


1 square
? equal parts
Each part shows?
The shaded part
shows?

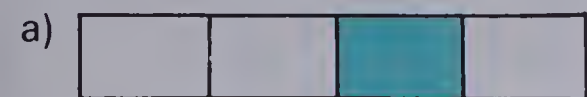


1. For each diagram

- give the number of equal parts
- write the fraction that each part shows
- write the fraction that shows what part is shaded.



2. What fraction is represented?



3. Draw number lines to show

a) $\frac{3}{4}$

b) $\frac{7}{10}$

c) $\frac{1}{2}$

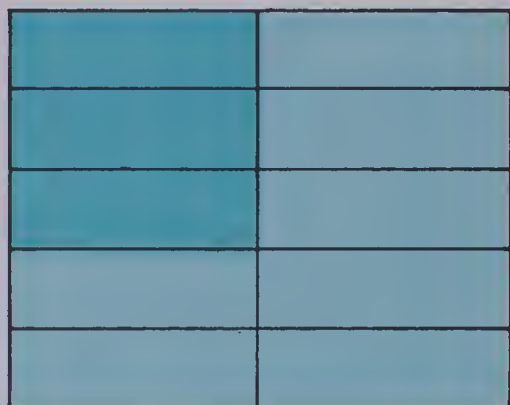
d) $\frac{2}{5}$

e) $\frac{4}{5}$

f) $\frac{5}{10}$



Numerator and Denominator



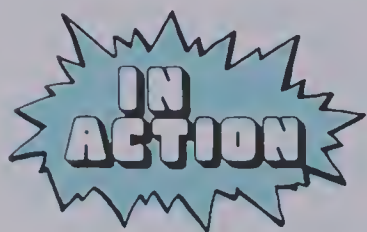
The **numerator** tells the number of equal parts to be considered.

$$\frac{3}{10}$$

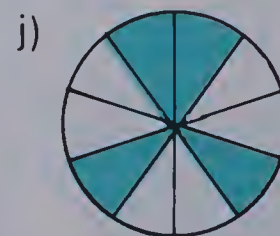
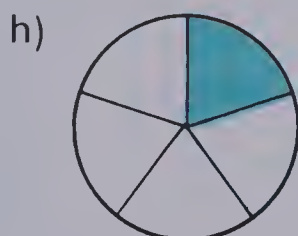
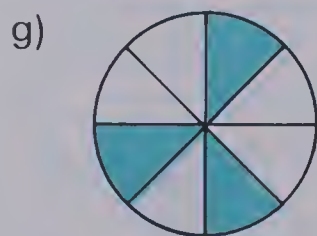
NUMERATOR

DENOMINATOR

The **denominator** tells the number of equal parts.



1. Write the fraction.



2. Write a fraction for each of the following.

a) The numerator is an odd number, the denominator is an even number.

b) The denominator is a prime number, the numerator is a composite number.

c) The sum of the numerator and denominator is 7.

d) The difference between the numerator and denominator is 5.

e) The numerator divided by the denominator is 2.

f) The numerator is 4 more than the denominator.

g) The numerator is a square number, the denominator is a triangular number.



Equivalent Fractions

2 different fractions that name the same point on a fractional number line are called **equivalent fractions**.

a)

$\frac{5}{10} = \frac{1}{2}$
 ? is equivalent to ?

b)

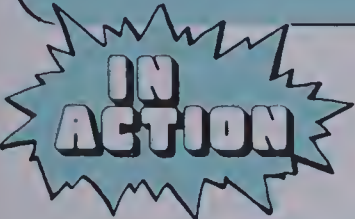
$\frac{8}{10} = \frac{4}{5}$
 $\frac{8}{10}$ is equivalent to $\frac{?}{5}$

c)

$\frac{5}{5} = ?$
 ? is equivalent to ?

d)

? = ?
 ? is equivalent to ?



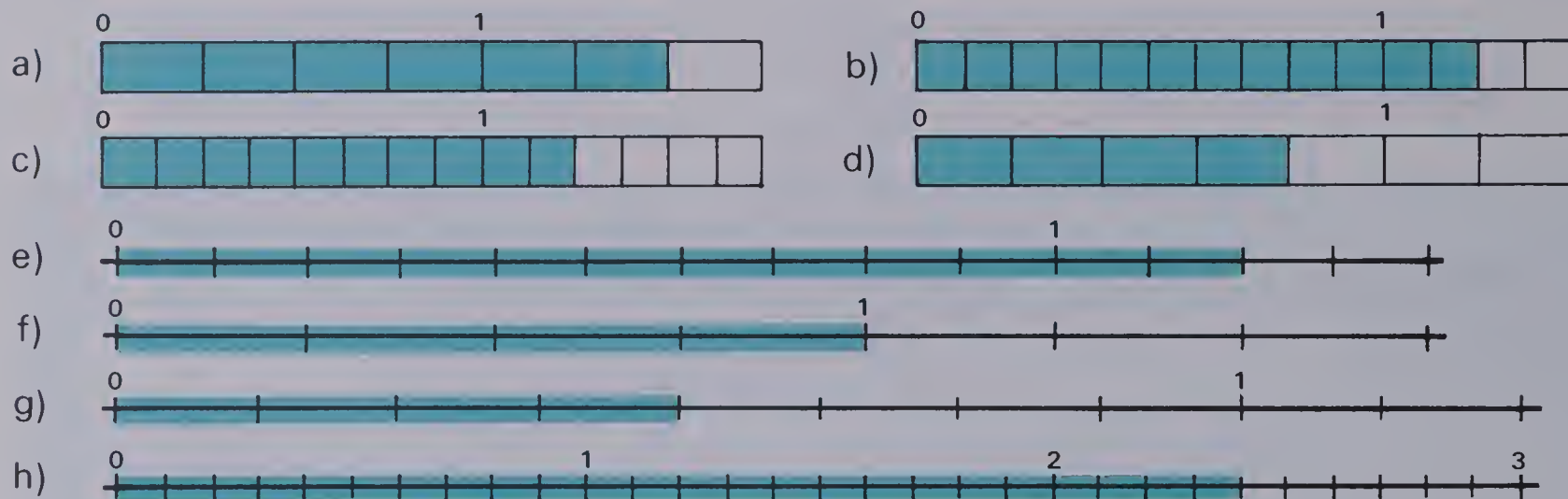
1. Use the number lines to find the equivalent fractions illustrated.

a)

b)



2. Write 2 equivalent fractions to show what part is shaded.



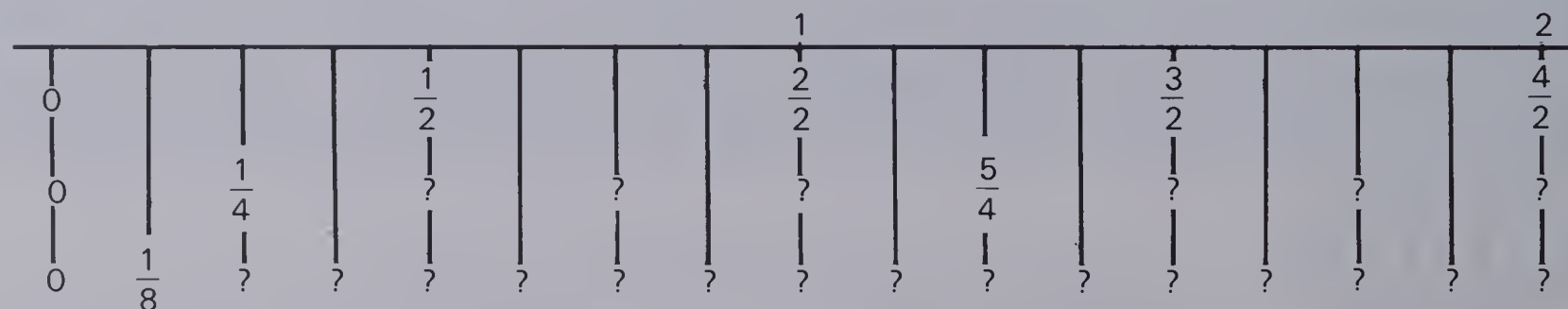
3. Complete.

a) $\frac{1}{10} = \frac{?}{100}$ b) $\frac{2}{10} = \frac{1}{?}$ c) $\frac{?}{4} = \frac{2}{8}$ d) $\frac{30}{?} = \frac{3}{10}$ e) $\frac{1}{2} = \frac{?}{8}$
 f) $\frac{80}{100} = \frac{4}{?}$ g) $\frac{3}{5} = \frac{?}{10}$ h) $\frac{100}{?} = \frac{4}{4}$ i) $\frac{7}{5} = \frac{?}{10}$ j) $\frac{?}{2} = \frac{12}{8}$

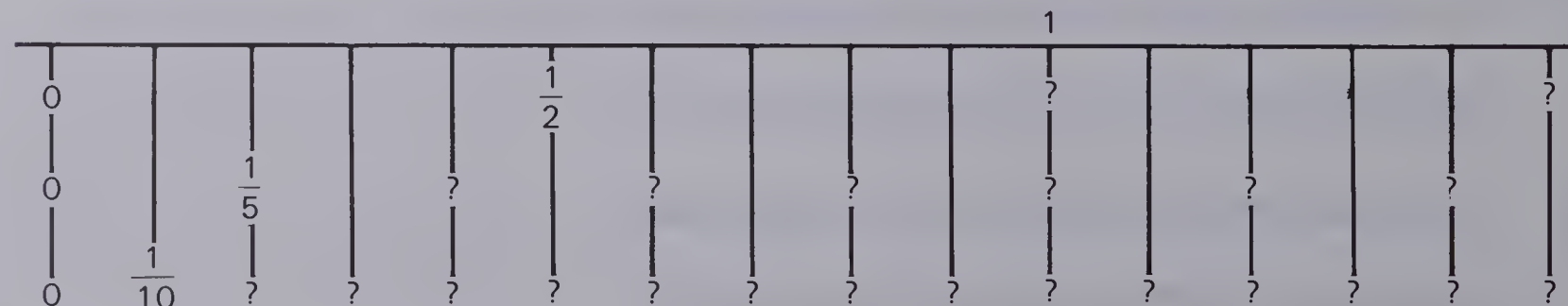
4. Write fractions equivalent to

a) $\frac{2}{5}$ b) $\frac{3}{4}$ c) $\frac{7}{10}$ d) $\frac{50}{100}$ e) $\frac{6}{10}$ f) $\frac{8}{8}$ g) $\frac{8}{5}$ h) $\frac{80}{100}$

5. Copy and complete the equivalent fraction chart for halves, quarters, and eighths.



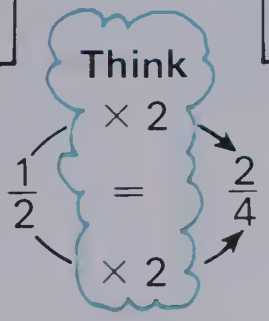
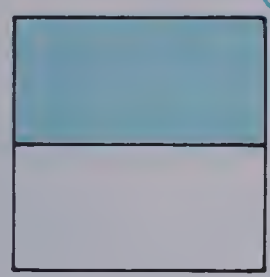
6. Copy and complete this equivalent fraction chart for halves, fifths, and tenths.



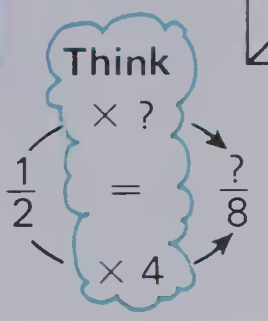
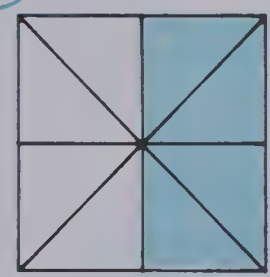
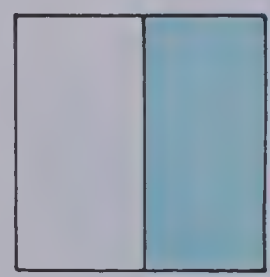


Forming Equivalent Fractions by Multiplication

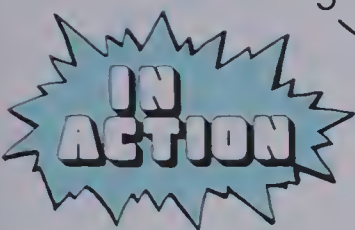
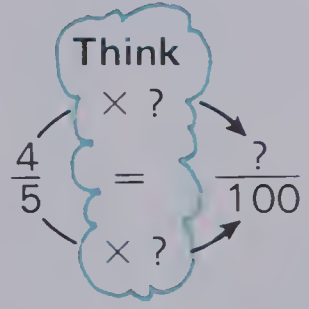
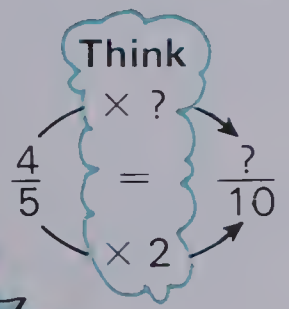
$\frac{1}{2} = \frac{?}{4}$



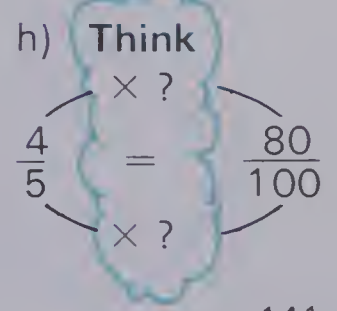
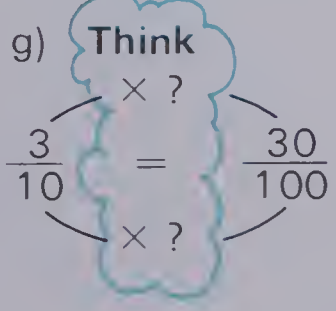
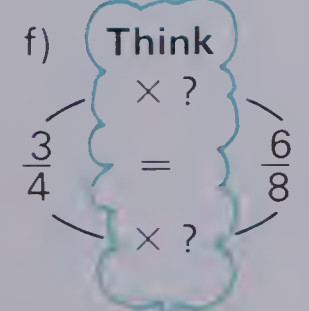
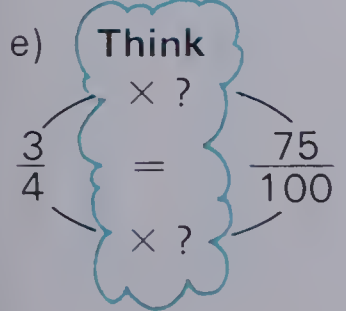
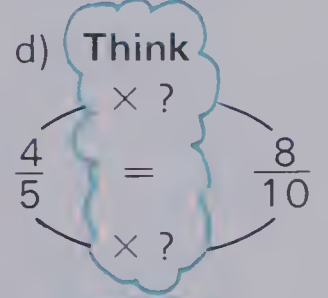
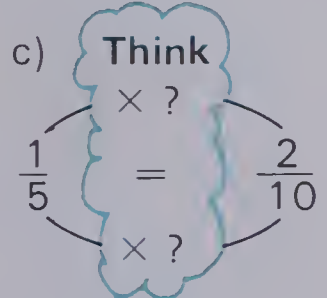
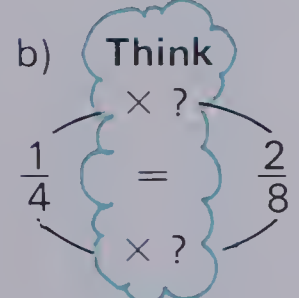
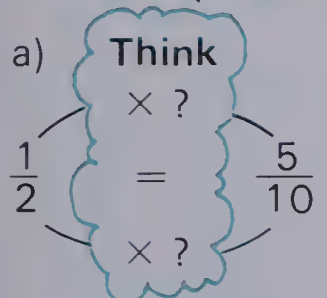
$\frac{1}{2} = \frac{?}{8}$



To find the equivalent fraction, multiply the numerator by the same number used to multiply the denominator.



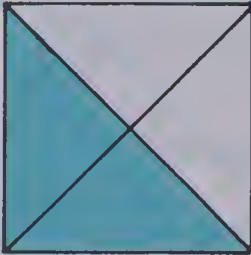
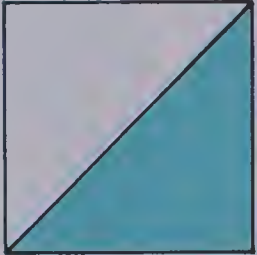
What factor would you use?





Forming Equivalent Fractions by Division

$\frac{2}{4} = \frac{?}{2}$

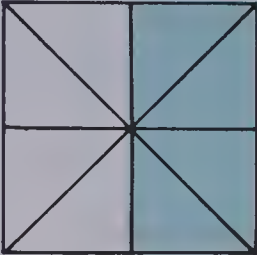
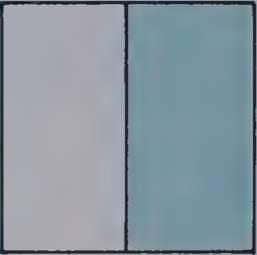



$\frac{2}{4}$

Think
 $\div 2$
 =
 $\div 2$

$\frac{1}{2}$

$\frac{4}{8} = \frac{?}{2}$

$\frac{4}{8}$

Think
 $\div ?$
 =
 $\div 4$

$\frac{?}{2}$

To find the equivalent fraction,
divide the numerator by the same number
used to divide the denominator.

$\frac{8}{10}$

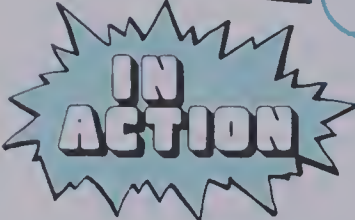
Think
 $\div ?$
 =
 $\div 2$

$\frac{?}{5}$

$\frac{80}{100}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{?}{5}$



1. What factor would you use?

a)

$\frac{2}{10}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{1}{5}$

b)

$\frac{5}{10}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{1}{2}$

c)

$\frac{4}{8}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{2}{4}$

d)

$\frac{40}{100}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{2}{5}$

e)

$\frac{50}{100}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{1}{2}$

f)

$\frac{8}{10}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{4}{5}$

g)

$\frac{40}{100}$

Think
 $\div ?$
 =
 $\div ?$

$\frac{4}{10}$

h)

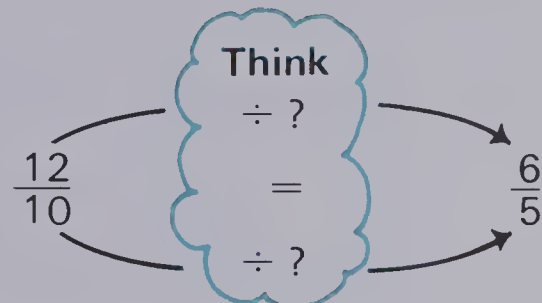
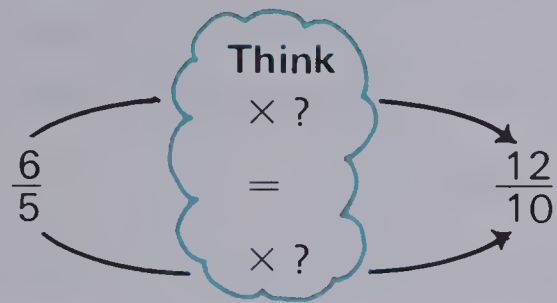
$\frac{6}{10}$

Think
 $\div ?$
 =
 $\div ?$

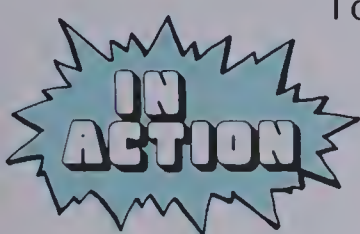
$\frac{3}{5}$



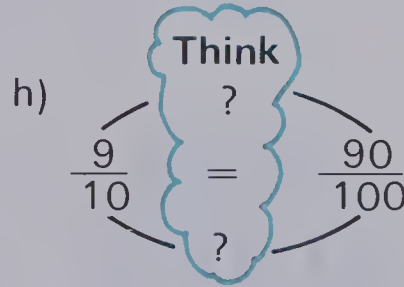
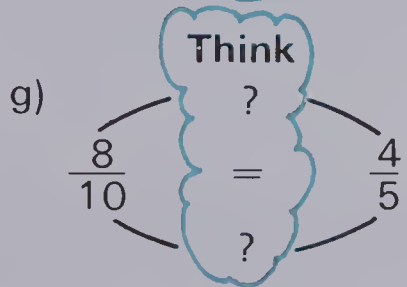
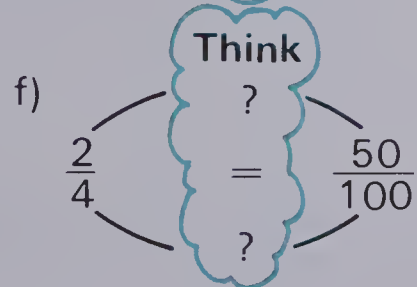
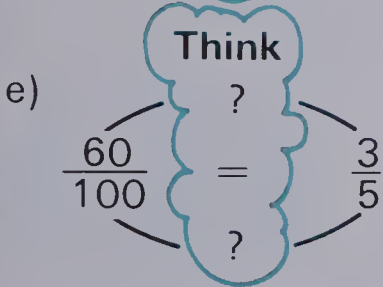
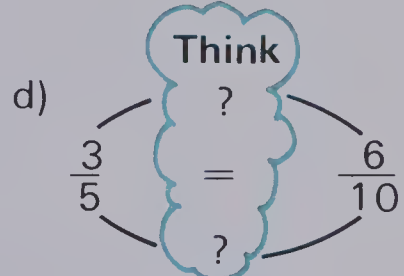
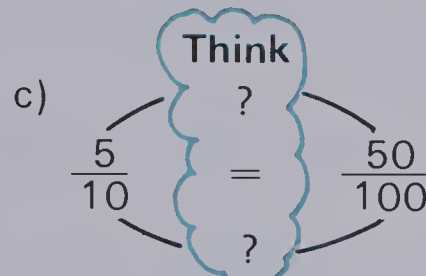
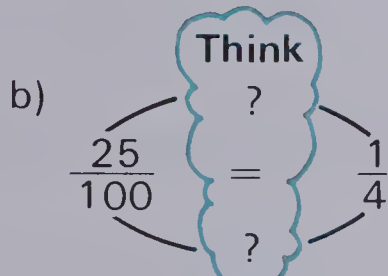
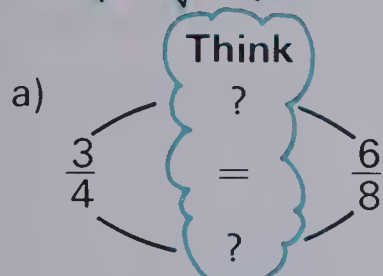
Forming Equivalent Fractions



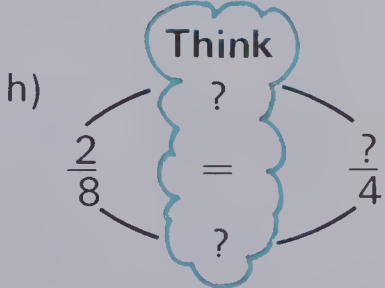
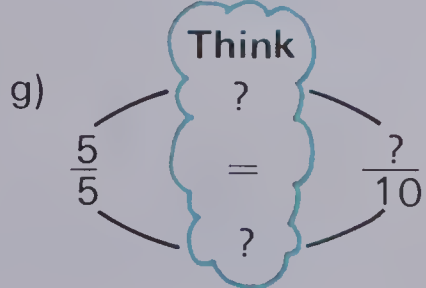
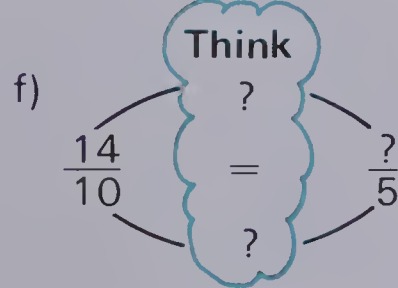
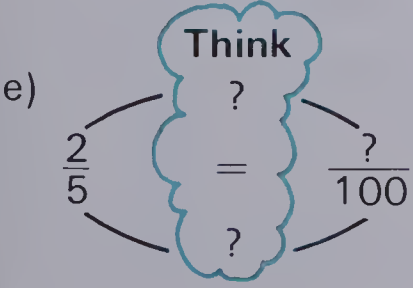
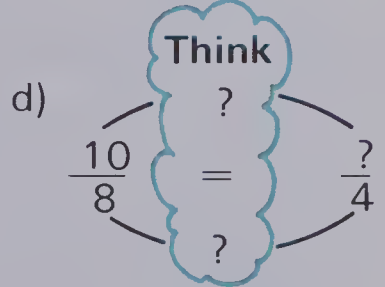
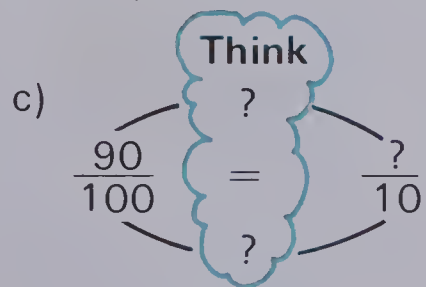
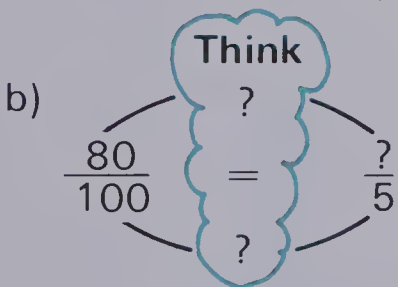
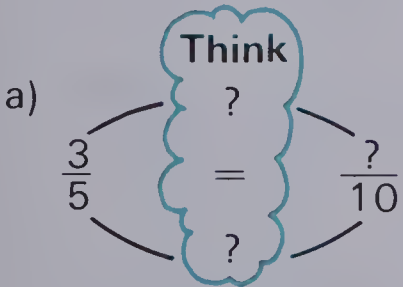
To find the equivalent fraction, we can multiply or divide both the numerator and denominator by the same number.



1. What factor and what operation would you use?

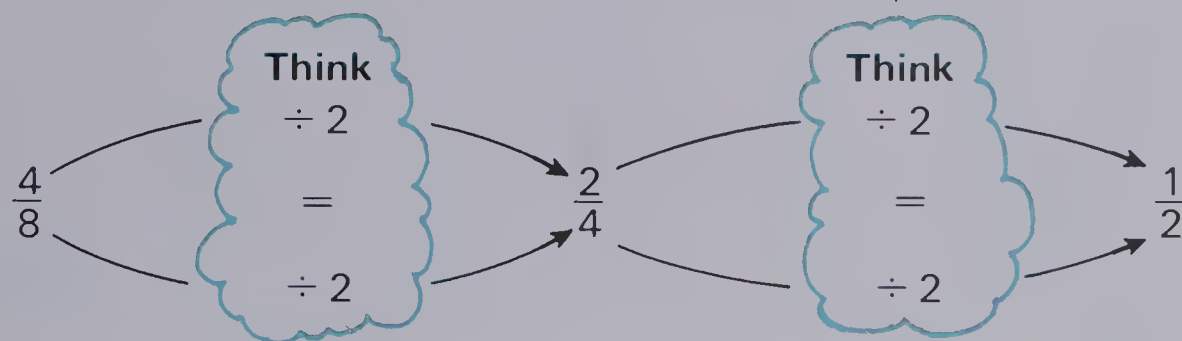


2. Copy and complete.

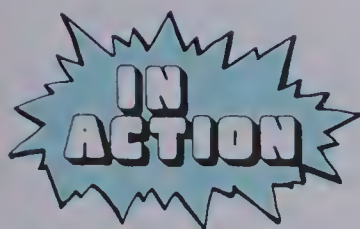
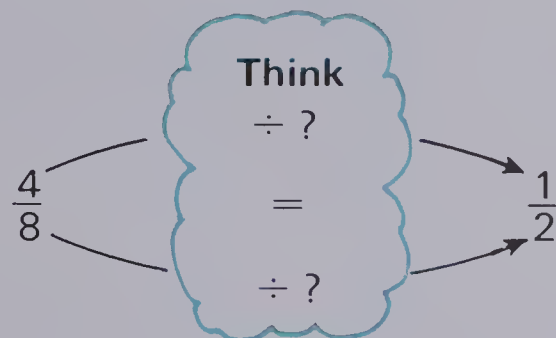


Reducing to Least Terms

To reduce a fraction to **lower terms**
we divide the numerator and the denominator by a common factor.



To reduce a fraction to **least terms**
we divide the numerator and the denominator
by the greatest common factor of the numerator and denominator.



1. Write all the lower terms fractions for each.

- a) $\frac{4}{10}$ b) $\frac{12}{8}$ c) $\frac{20}{100}$ d) $\frac{4}{8}$ e) $\frac{4}{5}$ f) $\frac{6}{4}$ g) $\frac{50}{100}$ h) $\frac{12}{10}$

2. Select from the set the least-terms fraction for the given fraction.

- a) $\frac{2}{10} \left\{ \frac{20}{100}, \frac{1}{5}, \frac{2}{5} \right\}$ b) $\frac{2}{4} \left\{ \frac{4}{8}, \frac{4}{2}, \frac{1}{2} \right\}$ c) $\frac{75}{100} \left\{ \frac{15}{20}, \frac{3}{4}, \frac{6}{8} \right\}$
d) $\frac{100}{200} \left\{ \frac{50}{100}, \frac{20}{40}, \frac{2}{4}, \frac{1}{2} \right\}$ e) $\frac{60}{100} \left\{ \frac{6}{10}, \frac{30}{50}, \frac{3}{5} \right\}$ f) $\frac{4}{5} \left\{ \frac{8}{10}, \frac{4}{5}, \frac{80}{100} \right\}$

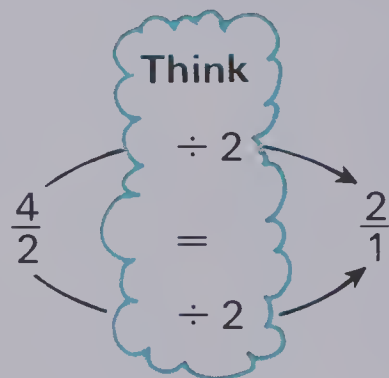
3. Write the least-terms fraction for each.

- a) $\frac{10}{100}$ b) $\frac{2}{8}$ c) $\frac{8}{10}$ d) $\frac{40}{100}$ e) $\frac{2}{4}$ f) $\frac{6}{10}$ g) $\frac{6}{8}$ h) $\frac{50}{100}$
i) $\frac{2}{10}$ j) $\frac{12}{8}$ k) $\frac{7}{4}$ l) $\frac{14}{10}$ m) $\frac{70}{100}$ n) $\frac{5}{3}$ o) $\frac{10}{5}$ p) $\frac{3}{2}$



Reducing to Least Terms

In reducing a fraction to least terms, sometimes the denominator becomes 1.
The fraction is then equivalent to a whole number.



$$\frac{15}{3} = \frac{15 \div 3}{3 \div 3} \\ = \frac{5}{1} \text{ or } 5$$

$$\frac{100}{25} = \frac{100 \div 25}{25 \div 25} \\ = \frac{4}{1} \text{ or } 4$$

We may wish to express a whole number as fraction.

$$3 = \frac{3}{1} \\ = \frac{3 \times 2}{1 \times 2} \\ = \frac{6}{2}$$

$$5 = \frac{5}{1} \\ = \frac{5 \times 4}{1 \times 4} \\ = \frac{20}{4}$$

$$8 = \frac{8}{1} \\ = \frac{8 \times 100}{1 \times 100} \\ = \frac{800}{100}$$



- Express as a fraction with a denominator of 1.
a) 3 b) 6 c) 10 d) 28 e) 100 f) 120
- Express as a whole number.
a) $\frac{20}{1}$ b) $\frac{8}{1}$ c) $\frac{30}{1}$ d) $\frac{16}{1}$ e) $\frac{55}{1}$ f) $\frac{110}{1}$
- Reduce to least terms.
a) $\frac{8}{4}$ b) $\frac{15}{5}$ c) $\frac{16}{8}$ d) $\frac{25}{5}$ e) $\frac{10}{10}$ f) $\frac{40}{10}$
g) $\frac{100}{10}$ h) $\frac{35}{10}$ i) $\frac{50}{2}$ j) $\frac{18}{4}$ k) $\frac{60}{5}$ l) $\frac{44}{4}$
- Express each of the whole numbers 4, 7, 10 as a fraction with
a) denominator 3 b) denominator 5 c) denominator 100.

Another Meaning of a Fraction

first meaning

5 equal parts
3 parts are considered



second meaning

$$\frac{3}{5}$$

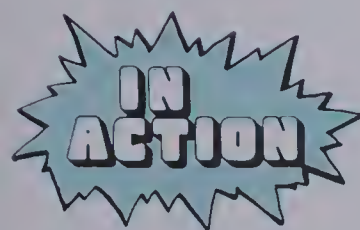
$$3 \div 5 = 0.6$$

$$\begin{array}{r} 0.6 \\ 5 \overline{) 3.0} \\ \underline{30} \end{array}$$

Think of a fraction as the numerator divided by the denominator.

$\frac{3}{4}$ means $3 \div 4$ or 0.75.

$$\begin{array}{r} 0.75 \\ 4 \overline{) 3.00} \\ \underline{28} \\ 20 \\ \underline{20} \end{array}$$



1. Write 2 meanings for each fraction.

- a) $\frac{1}{2}$ b) $\frac{4}{5}$ c) $\frac{3}{2}$ d) $\frac{5}{4}$ e) $\frac{7}{10}$ f) $\frac{7}{5}$ g) $\frac{13}{10}$

2. Divide the numerator by the denominator.

- a) $\frac{1}{4}$ b) $\frac{2}{5}$ c) $\frac{4}{10}$ d) $\frac{9}{10}$ e) $\frac{7}{4}$ f) $\frac{5}{5}$ g) $\frac{11}{10}$

3. Express as a decimal.

- a) $\frac{2}{4}$ b) $\frac{3}{5}$ c) $\frac{5}{2}$ d) $\frac{6}{10}$ e) $\frac{25}{100}$ f) $\frac{15}{10}$ g) $\frac{34}{100}$
h) $\frac{1}{10}$ i) $\frac{3}{4}$ j) $\frac{6}{5}$ k) $\frac{5}{100}$ l) $\frac{5}{2}$ m) $\frac{2}{10}$ n) $\frac{1}{5}$

EXPLORE

TIME/The 24-Hour Clock

The 24-hour clock has been used by the armed forces, railways and airlines for many years.

The 24-hour clock numbers the hours from 00 to 24 (from midnight to midnight).

When writing times on the 24-hour clock, always use 4 digits; the first 2 digits for hours, the last 2 digits for minutes past the hour.

The hours and minutes are separated by a colon.



is written as

09:00

is read as
"nine hours"



is written as

14:30

is read as
"fourteen thirty"

is written as

?

is read as
"?"



is written as

?

is read as
"?"

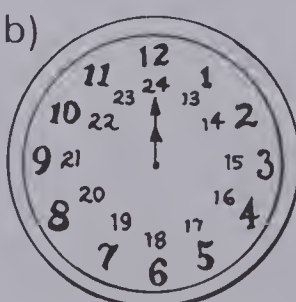


1. Show how each of the following times is written and read.

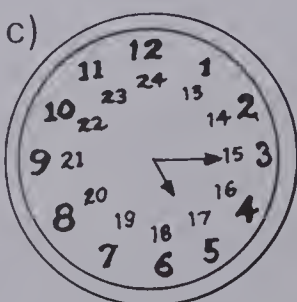
a)



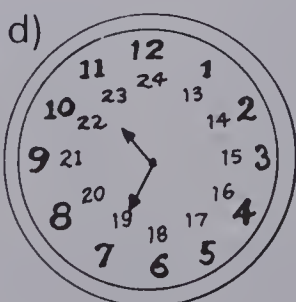
b)



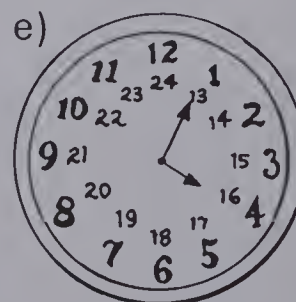
c)



d)



e)





2. Commuter trains travel daily between Hamilton, Ontario, and Oshawa, Ontario.

a) Find these 2 cities on a map.

What is the name of the lake near which they are located?

b) What is the distance between these 2 cities?

c) How long does it take the train to travel from

i) Hamilton to Oshawa

ii) Mimico to Scarborough

iii) Port Credit to Ajax?

d) What is the longest time the train travels without stopping?

e) What is the shortest time the train travels without stopping?

Station		Time
Hamilton	dp	10:45
Oakville		11:20
Port Credit		11:42
Mimico		11:55
Toronto	ar	12:07
Toronto	dp	12:13
Scarborough		12:28
Pickering		12:49
Ajax		13:01
Whitby		13:06
Oshawa	ar	13:20

f) Make up the schedule for the commuter train that leaves Hamilton at 12:45.

3. Draw up a schedule of the times you do the following.

Use the 24-hour clock.

a) you wake up

b) you eat breakfast

c) you leave for school

d) school starts in the morning

e) you eat lunch

f) school starts in the afternoon

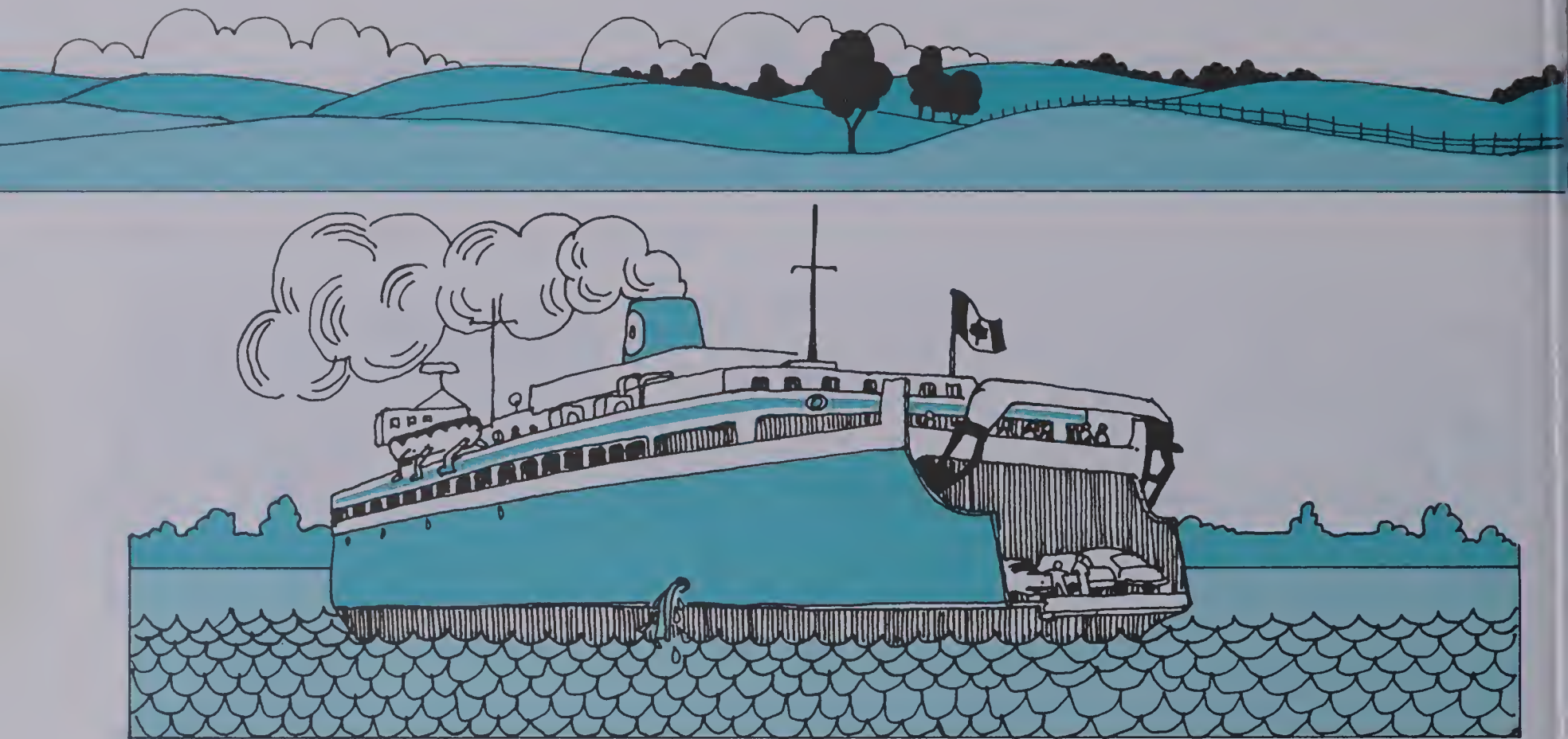
g) school ends

h) you arrive home

i) you eat dinner

j) you go to bed

4. Write the starting times of your 4 favourite television programs.



5. A ferry travels daily between North Sydney and Port Aux Basques. Find these 2 places on a map. On Mondays, the timetable for the ferry service is as follows.

	First ferry	Second ferry	Third ferry
North Sydney (Cape Breton Island)	dp 08:30	14:45	20:45
Port Aux Basques (Newfoundland)	ar 14:30	20:45	06:45

- How much time is there between
 - the first and second ferry
 - the second and third ferry?
- How long does it take to travel by ferry from North Sydney to Port Aux Basques? Is the time the same for each ferry?
- Find the distance from North Sydney to Port Aux Basques in kilometres. What is the average speed of the ferry in kilometres per hour (km /h)?

6. This table gives the time of 2 buses that travel from Edmonton to Calgary to Vancouver.

Edmonton dp	Calgary ar	Vancouver ar
10:00	13:15	18:20
12:00	15:15	19:50

- Find these places on a map and follow the route.
 - How long does it take each bus to travel from Edmonton to Calgary?
 - Each bus stops at Calgary for 1 h 15 min.
 - At what time does each bus leave Calgary?
 - What is the actual travelling time between Calgary and Vancouver?
7. Study a ferryboat, railway or airplane schedule that affects the community in which you live. Make up time questions to ask your classmates.

EXPLORE

SCALE/Drawing to Scale

Each of the objects is drawn to scale.
What is the actual length?



a) Robin

Scale 1:10



b) Dachshund

Scale 1:10



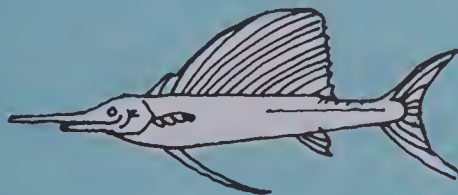
c) Bullfrog

Scale 1:5



d) Black Bear

Scale 1:50



e) Sailfish

Scale 1:50



f) Crow

Scale 1:20



g) Leaning Tower of Pisa
Scale 1:1000



h) Eiffel Tower
Scale 1:5000



i) CN Tower
Scale 1:10 000



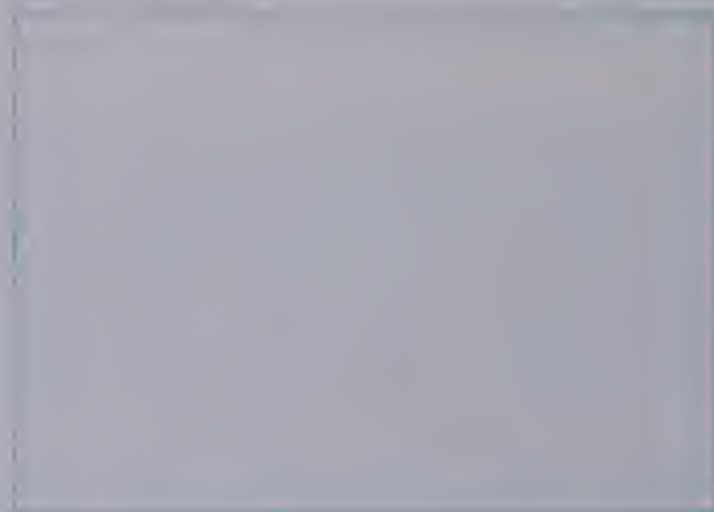
Drawing to Scale

To show plans of objects on paper, we draw them to scale.

This is the scale drawing of the top of a box.

The measurements are 0.5 the actual size (1:2).

The scale of the drawing is written as 1 cm to 2 cm, or 1:2, as 1 cm on the drawing represents 2 cm on the box.

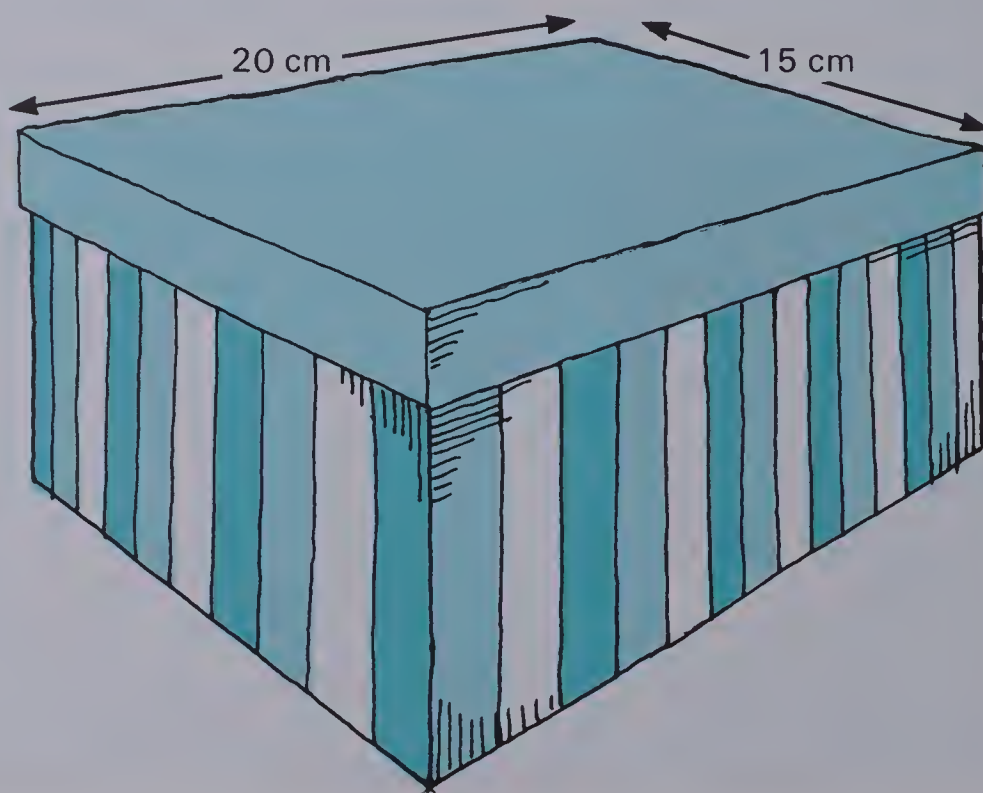


1. Measure the length and width of the drawing in a) centimetres b) millimetres.
2. What is the actual length and width of the box in a) centimetres b) millimetres?

If the measurements on the drawing had been 0.1 of the actual size, or 1 cm to 10 cm (1:10), what would be the actual length and width of the box?



1. Write the length of the box in a) centimetres b) millimetres.
2. Write the width of the box in a) centimetres b) millimetres.
3. Use a ruler to draw a full-size drawing of the top of the box (scale 1 cm to 1 cm, or 1:1).
4. Make a scale drawing of the top of the box that is
 - a) 1 cm to 2 cm, or 1:2
 - b) 1 cm to 10 cm, or 1:10
 - c) 1 cm to 20 cm, or 1:20.





5. Write the actual measurements represented by these line segments.

a) Scale 1 mm to 10 mm (1:10)



b) Scale 1 cm to 20 cm (1:20)



c) Scale 1 mm to 100 mm (1:100)



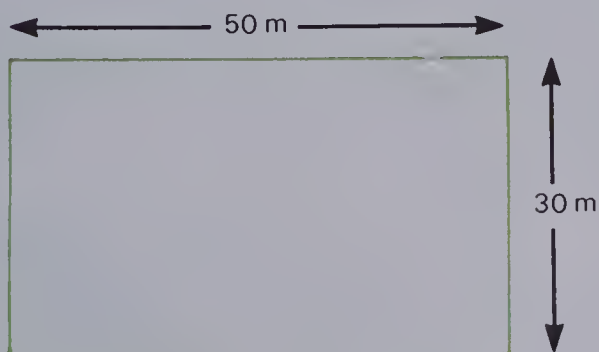
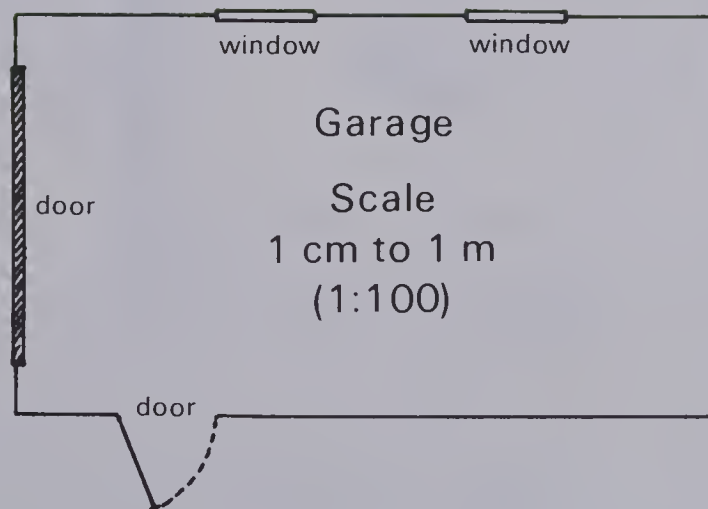
d) Scale 1 cm to 100 cm (1:100)



e) Scale 1 cm to 1 m (1:100)



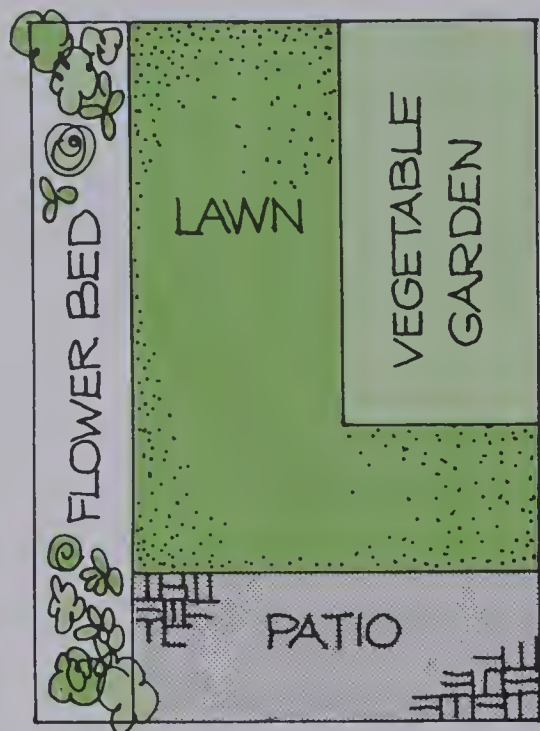
6. a) What are the dimension of the garage in metres?
 b) What is the actual width of the front door?
 c) What actual length in metres is represented in the scale drawing by
 i) 3 cm ii) 5 cm iii) 2.5 cm?
 d) What is the area of the garage in square metres?



7. a) Measure the dimensions of the scale drawing in centimetres. What are they?
 b) What is the scale of this drawing?
 c) What is the area of this piece of land in square metres?

8. Make a scale drawing of a room 5 m long and 4.5 m wide. Use the scale 1 cm to 1 m (1:100).

9. Make a scale drawing of a swimming pool 12 m long and 6 m wide. Use the scale 1 cm to 2 m (1:200).



This is a scale drawing of the garden the Burnes plan to make at the back of their house.

10. On the scale drawing, carefully measure the length and width in centimetres of

a) the whole garden	b) the patio
c) the flower bed	d) the vegetable garden.
11. The plan is drawn to a scale of 1 cm to 2 m (1:200). What are the actual measurements in metres of each part of the garden?

12. Find the perimeter in metres of

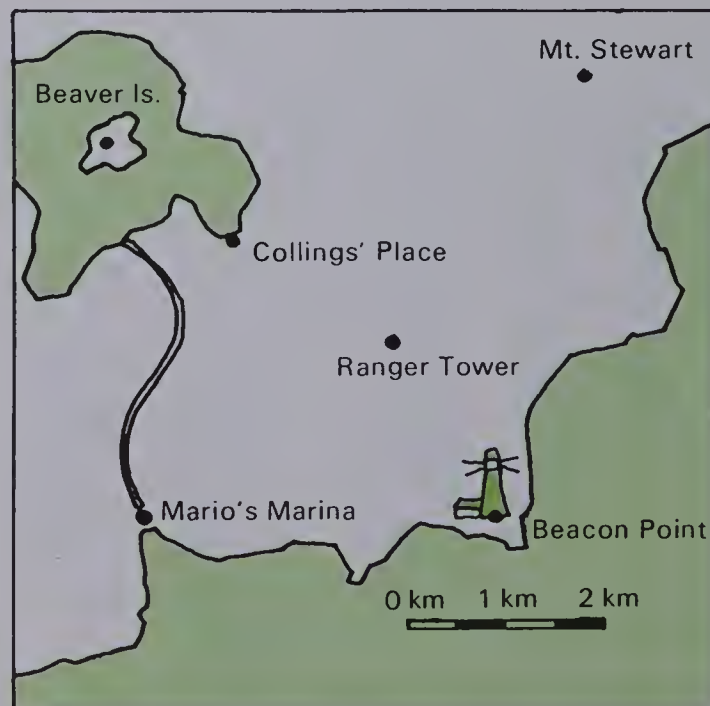
a) the whole garden	b) the lawn
c) the vegetable garden.	

13. Find, in square metres, the area of

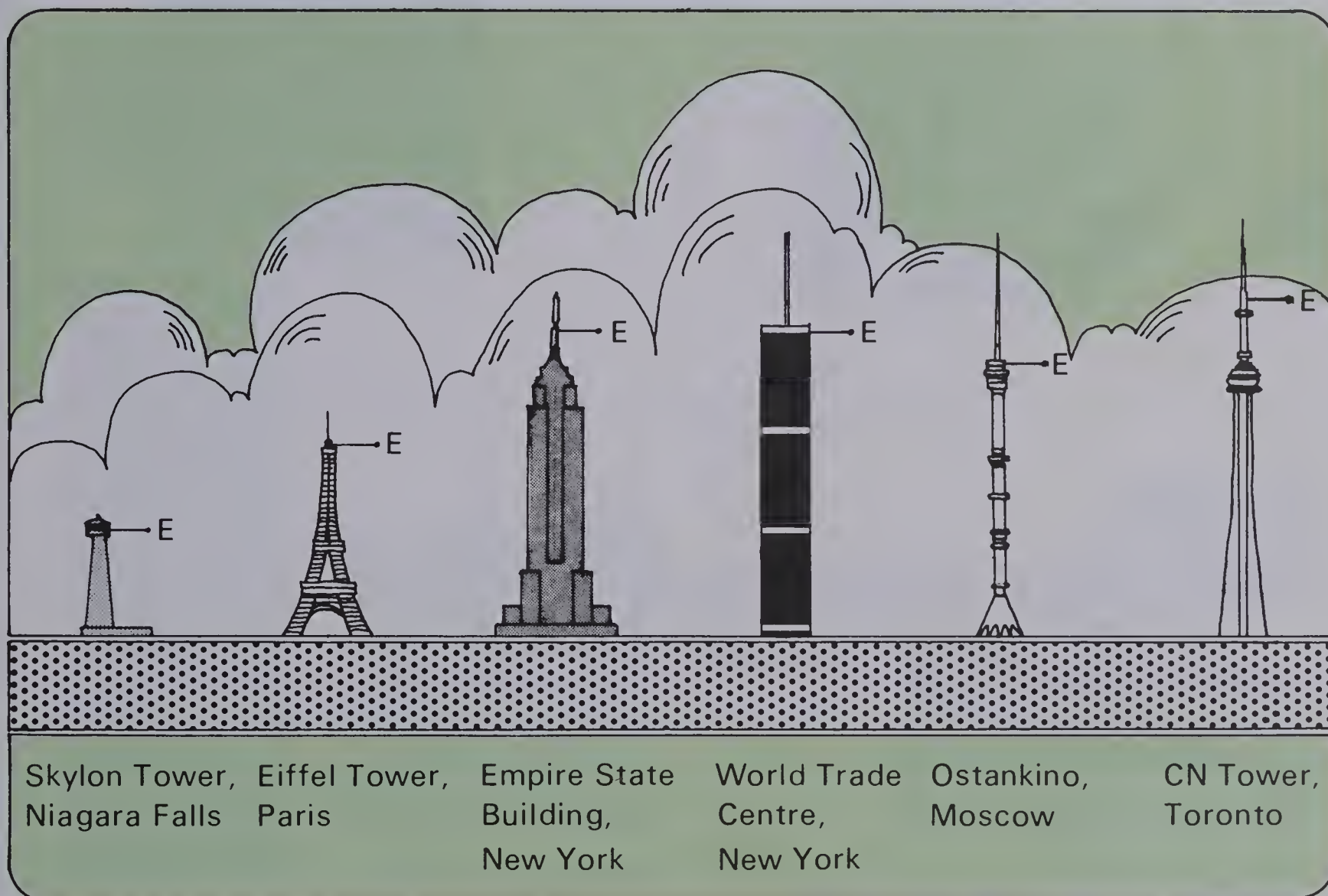
a) the patio	b) the flower bed
c) the lawn	d) the vegetable garden.

On most maps the scale is shown by a line segment and the measurement represented by the segment.

14. What is the scale of this map?
15. Use the map and the scale to give the following distances.
 - a) Mario's Marina to Beacon Point
 - b) Collings' Place to Mount Stewart
 - c) the Ranger Tower to Collings' Place
 - d) Collings' Place to Beaver Island
 - e) Mount Stewart to Beacon Point



16. The diagram shows 6 tall structures.



Scale 1 cm to 100 m (1:10 000)

- What is the height of each building to the nearest 5 m?
- What is the difference in height between the highest and shortest building?
- The elevator at the CN Tower takes about 1.2 min to travel to a height of 360 m. How long would it take an elevator travelling at the same speed to reach the height marked E for each building?

EXPLORE

CALCULATING AREA



$$\text{Area} = 1 \text{ cm}^2$$



$$\begin{aligned}\text{Area} &= (3 \times 2) \text{ cm}^2 \\ &= 6 \text{ cm}^2\end{aligned}$$

The area of the rectangular region is 6 cm^2 .



$$\begin{aligned}\text{Area} &= (4.2 \times 3.5) \text{ cm}^2 \\ &= 14.7 \text{ cm}^2\end{aligned}$$

The area of the rectangular region is 14.7 cm^2 .



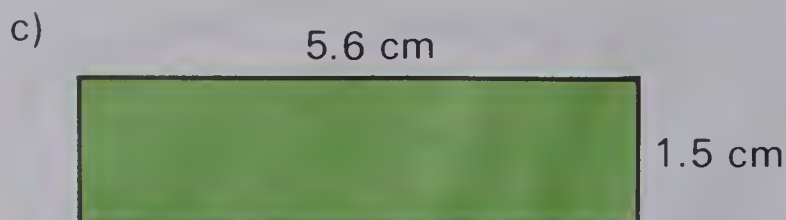
1. Complete.



$$\begin{aligned}\text{Area} &= (5 \times 2) \text{ cm}^2 \\ &= ? \text{ cm}^2\end{aligned}$$



$$\begin{aligned}\text{Area} &= (? \times ?) \text{ cm}^2 \\ &= ? \text{ cm}^2\end{aligned}$$



$$\begin{aligned}\text{Area} &= (5.6 \times 1.5) \text{ cm}^2 \\ &= ? \text{ cm}^2\end{aligned}$$



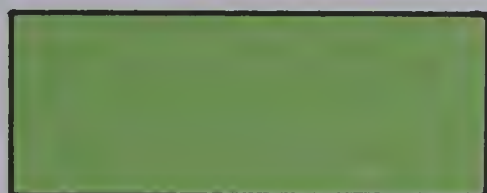
$$\begin{aligned}\text{Area} &= (? \times ?) \text{ cm}^2 \\ &= ? \text{ cm}^2\end{aligned}$$



2. Estimate, then find the area of each shape.

48 mm

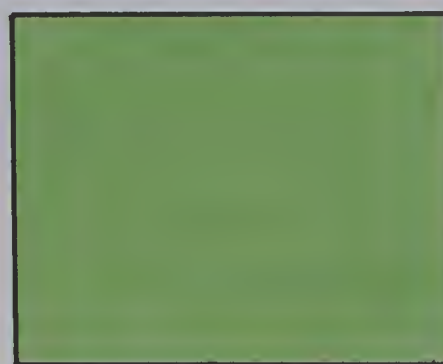
a)



18 mm

4.4 m

b)



3.5 m

13 cm

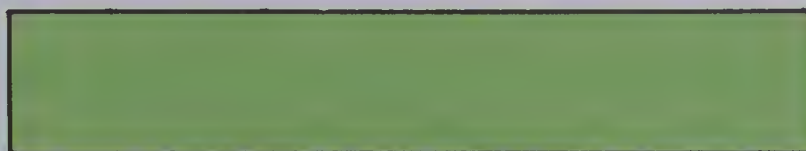
c)



27.4 cm

6.1 m

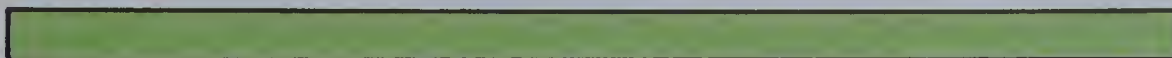
d)



0.7 m

11.8 m

e)



0.5 m

3. a) Draw a rectangular shape with an area of 18.5 cm^2 .

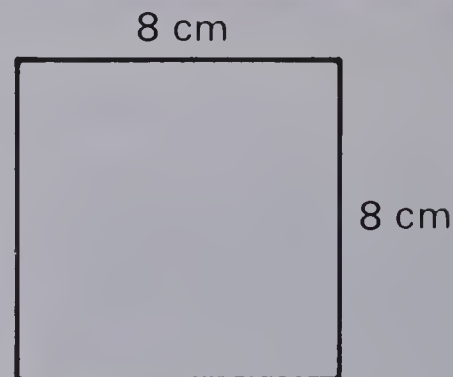
b) Find the perimeter of the shape.

4. a) Draw a rectangle with a perimeter of 14.2 cm.

b) Find the area of the region.

Area

Cut out several 8 cm by 8 cm square shapes.
What is the area of each?



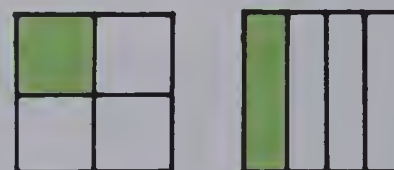
Fold 1 square shape like this.
What is the area of the shaded part?



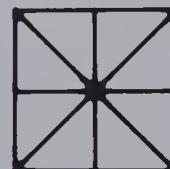
Fold the square shape again, like this.
What is the area of each part?



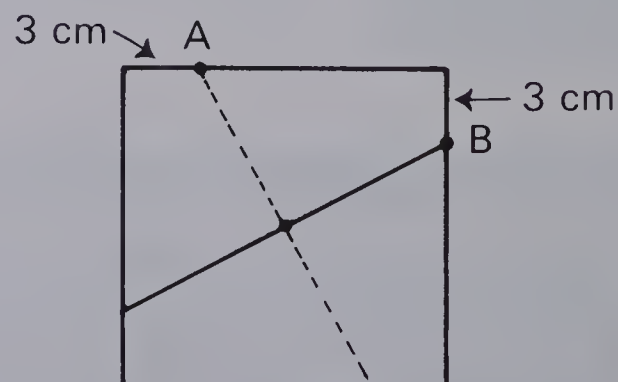
How do the areas of the 2 shaded regions compare?
Can you show that your answer is correct?
What is the area of each part?



Fold one of your square shapes another way
to show a part having an area of 8 cm^2 .



Take another square shape.
Locate the centre by folding.
Mark a point A on a side 3 cm from a vertex.
Draw a line from that point through the
centre to the opposite side.
Mark another point B on an adjacent side 3 cm
from the closest vertex.
Draw a line from point B through the centre
to the opposite side.
The square shape is now divided into 4 parts.
By rotating a tracing of the square about the centre,
what do you discover about each part? What is the area of each part?





Calculating Area/Irregular Regions

To find the area of an irregular region, divide it into smaller rectangular regions.

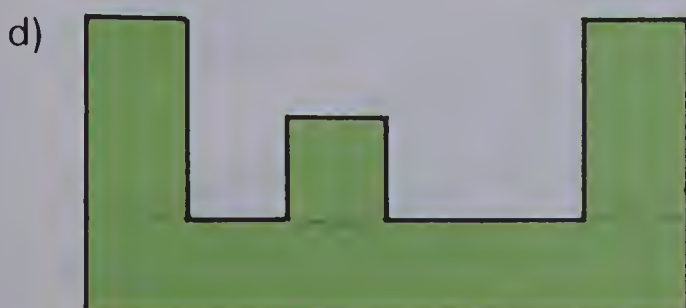
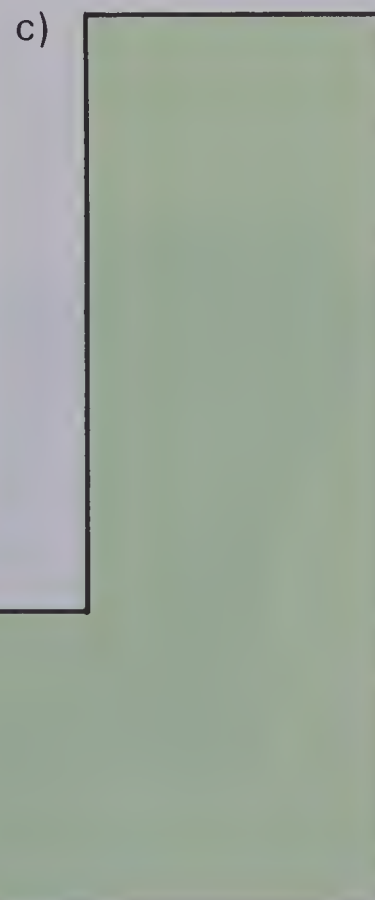
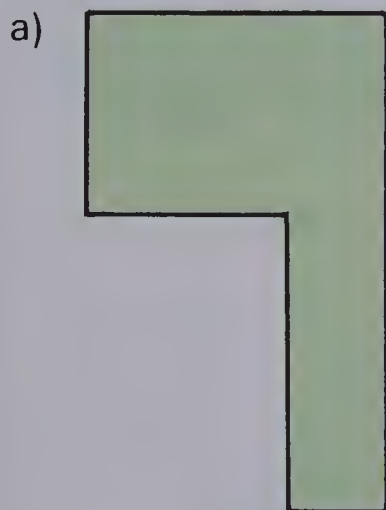
Find the area of each smaller part, then add to find the total area.



$$\begin{aligned}\text{Area} &= (3 \times 2) \text{ cm}^2 + (3 \times 4) \text{ cm}^2 \\ &= 6 \text{ cm}^2 + 12 \text{ cm}^2 \\ &= 18 \text{ cm}^2\end{aligned}$$



1. Calculate the area of each region.





Area of Irregular Shapes



Use this method of estimating areas of irregular shapes.

This square shape has an area of 1 cm^2 .

Count 1 cm^2 .



This shape has an area of 0.5 cm^2 .

Count 0.5 cm^2 .



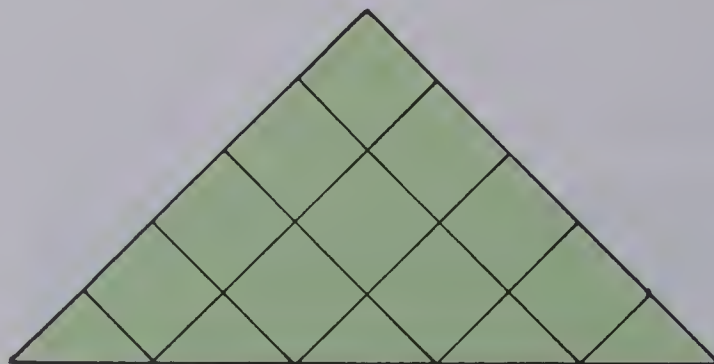
This shape has an area greater than 0.5 cm^2 .

Count 1 cm^2 .

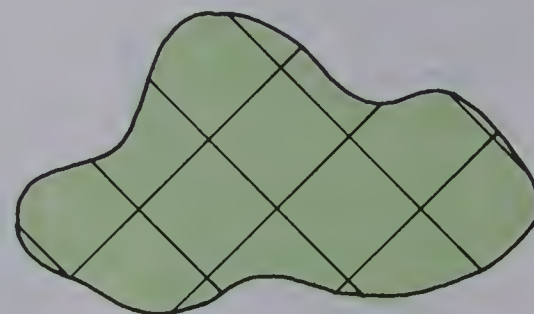


This shape has an area less than 0.5 cm^2 .

Count 0 cm^2 .



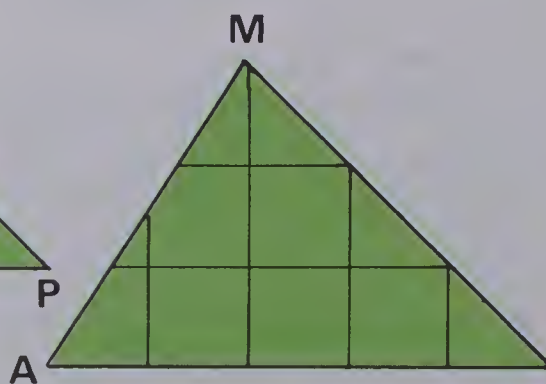
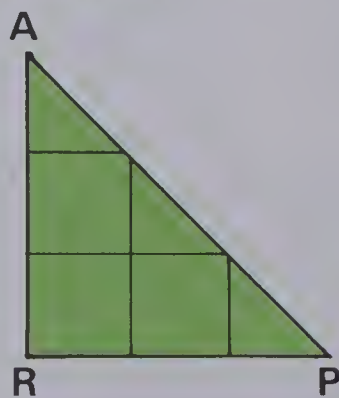
Area = 12.5 cm^2



Area is about $? \text{ cm}^2$

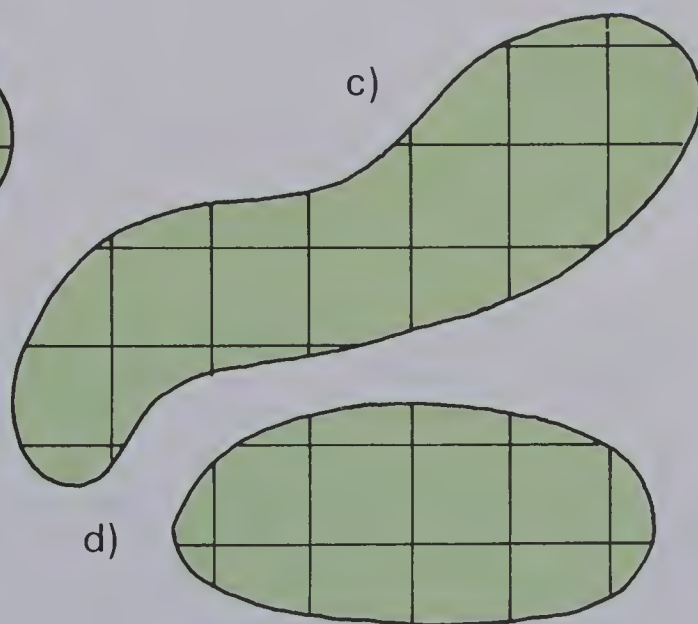
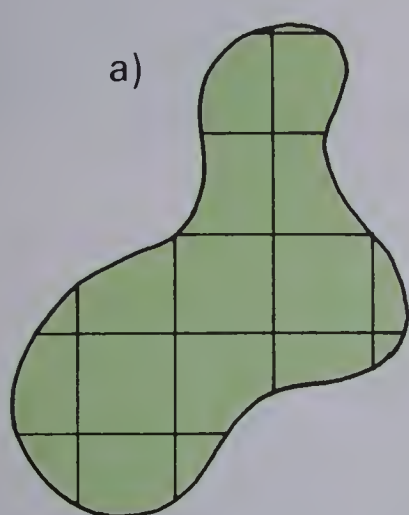


1. Find the area of each triangular region.

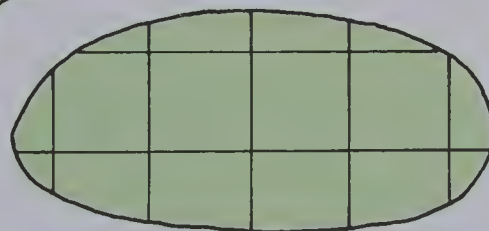




2. Find the approximate area of each shape.

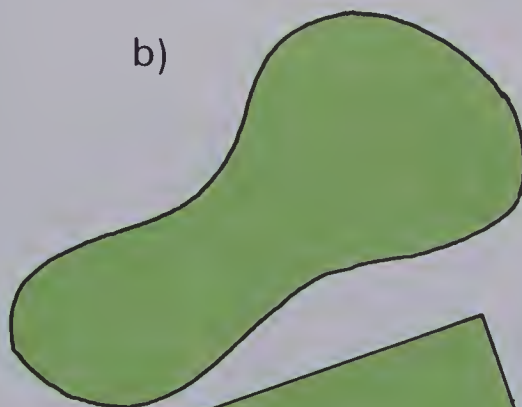
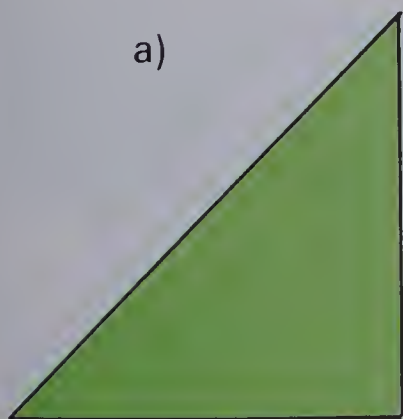


d)



3. Find the approximate area of each.

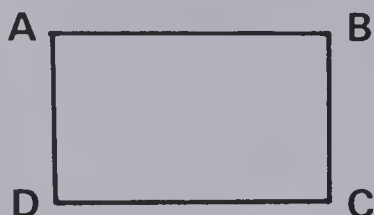
Use a clear sheet of acetate marked in square centimetres
or mark a sheet of tracing paper
in square centimetres.



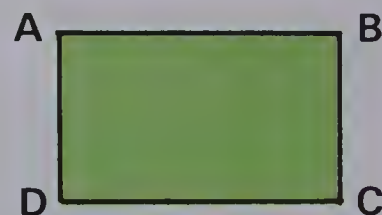
EXPLORE

AREA-PERIMETER RELATIONSHIPS

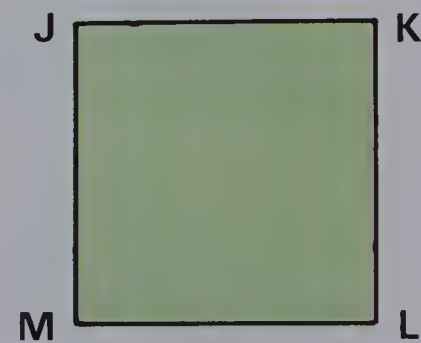
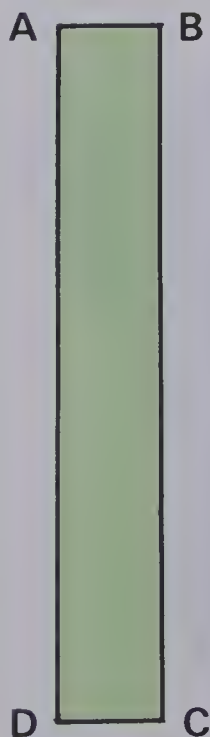
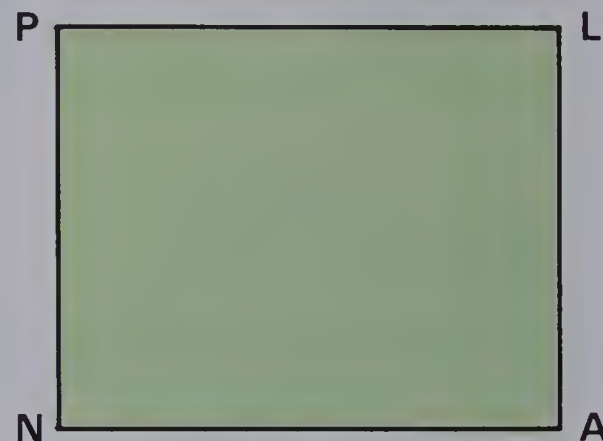
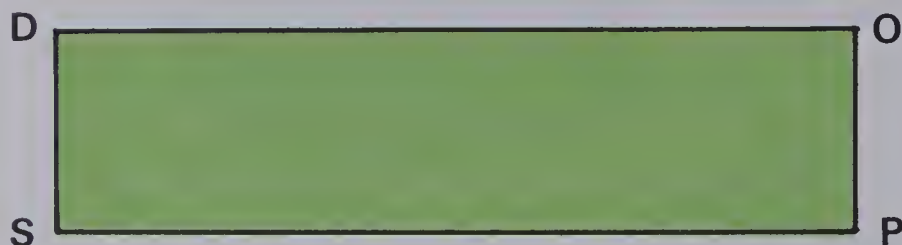
Rectangle ABCD means this figure.



Area of rectangle ABCD means this region.



Here are 5 rectangular regions.



Find the area of each.

List the rectangles in order from the one having the greatest area to the one having the least area.

Find the perimeter of each rectangle.
List the rectangles in order from the one having the greatest perimeter to the one having the least perimeter.

Why is the ordering for area and perimeter different?

Can you draw a rectangle for which the number of linear units in the perimeter is the same as the number of square units in the area?



1. a) On graph paper draw several rectangles, each having a perimeter of 16 cm. Name your rectangles.
- b) Draw and complete a chart like this.

Rectangle	Perimeter in centimetres	Length in centimetres	Width in centimetres	Area of region in square centimetres
	16			
	16			

- c) When you compare the number of linear units in the perimeter with the number of square units in the area, what pattern do you notice?
2. a) On graph paper draw several rectangles, each having an area of 16 cm². Name each one.
 - b) Draw and complete a chart like this.

Rectangle	Area in square centimetres	Length in centimetres	Width in centimetres	Perimeter in centimetres
	16			
	16			
	16			

- c) When you compare the number of linear units in the perimeter with the number of square units in the area, what pattern do you notice?

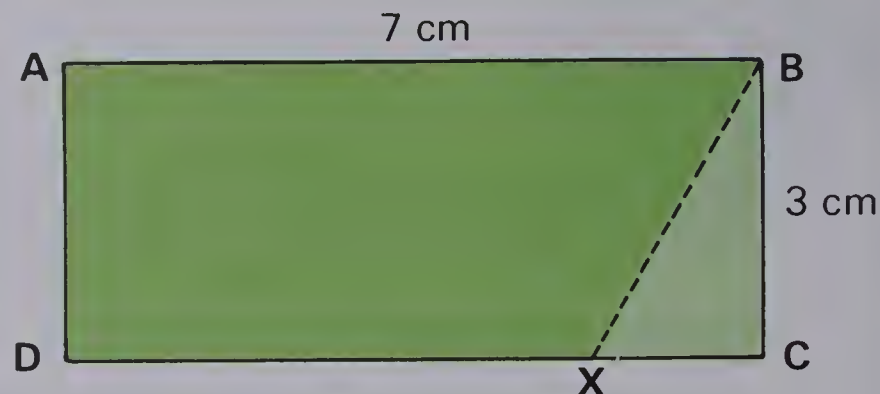


Area of a Parallelogram

Draw and cut out a rectangular region 7 cm by 3 cm.

What is the area?

Mark a point X 2 cm from C on DC.
Join the point X with the point B.



Cut out $\triangle BXC$ and slide it the distance and direction suggested by the slide arrow.

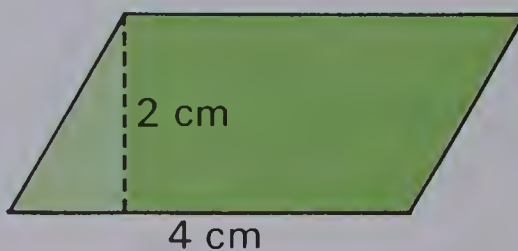
What shape have you formed?



How is the area of the parallelogram related to the area of the rectangle?

How do you find the area of a rectangle?

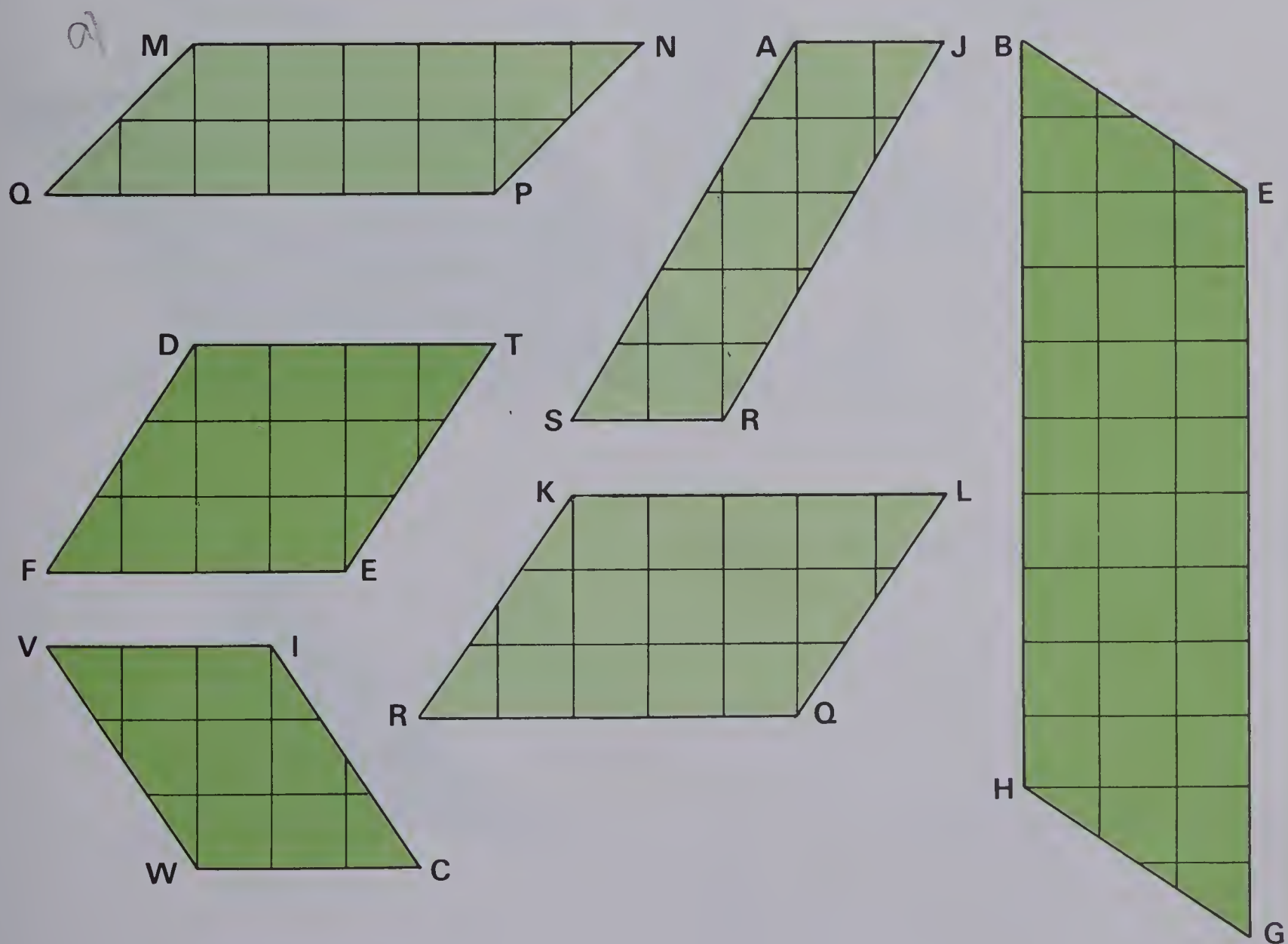
How might you find the area of the related parallelogram?



What is the area of this parallelogram?



1. a) Calculate the area of each parallelogram.
- b) Draw each parallelogram on squared paper and cut it out. Cut a part from each parallelogram and use that part to make a rectangle from your parallelogram.
- c) Calculate the area of each rectangle and thus determine the area of the parallelogram.

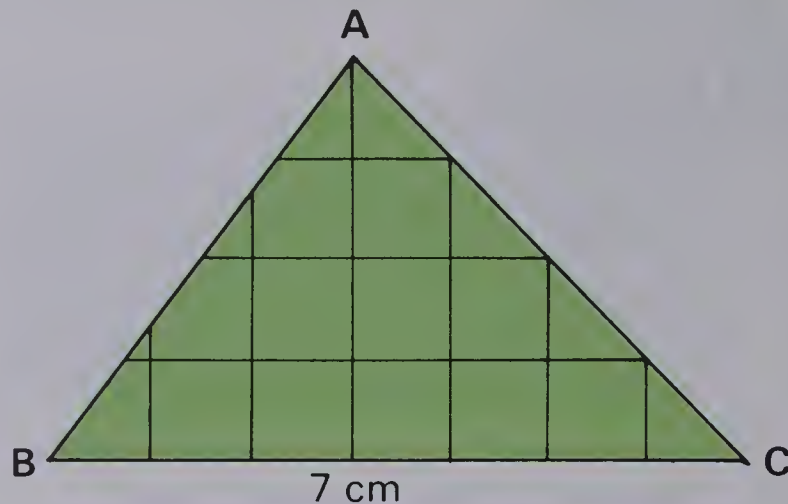




Area of a Triangle

Trace and cut out a model of this triangle.
Put the shape on paper
and draw around it.

Count squares to estimate the
area of $\triangle ABC$.

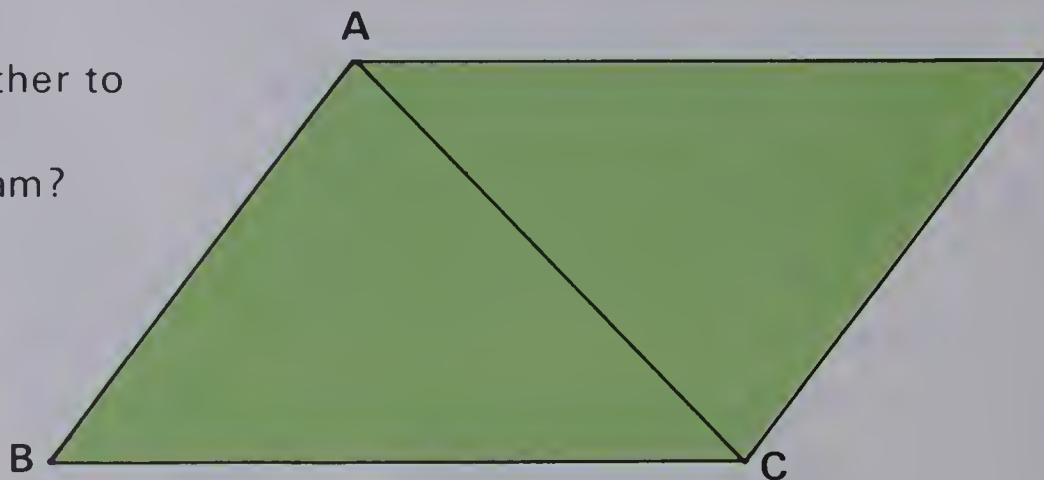


2 models of $\triangle ABC$ are placed together to
form a parallelogram.

What is the area of the parallelogram?

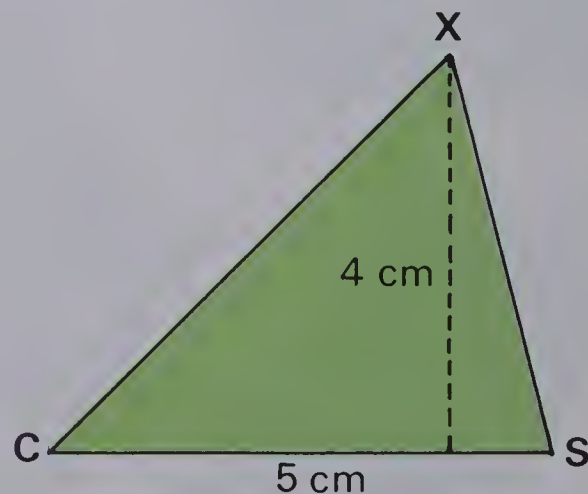
How did you calculate the area
of the parallelogram?

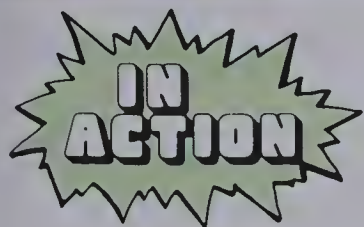
What is the area of $\triangle ABC$?



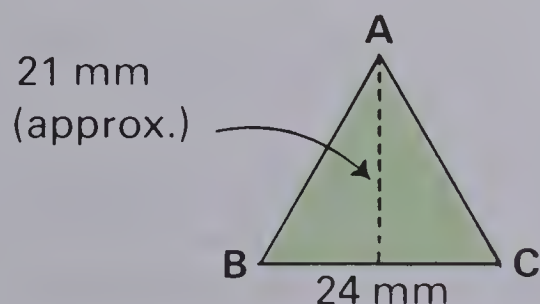
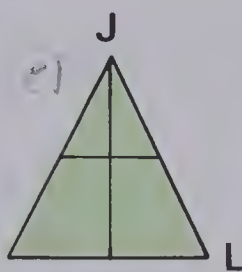
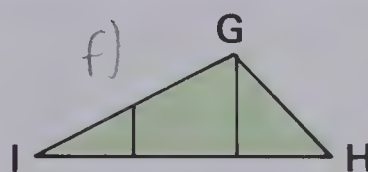
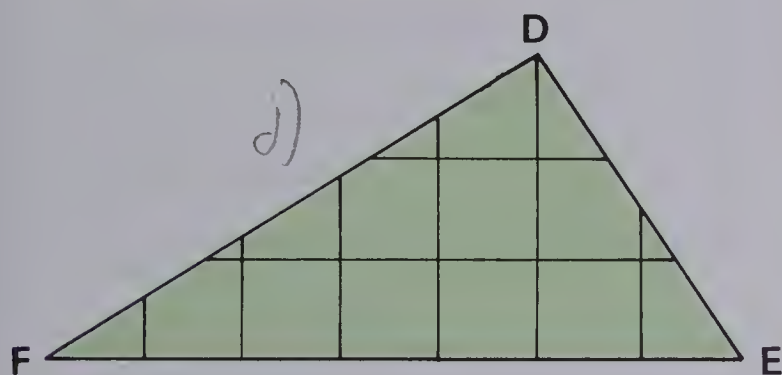
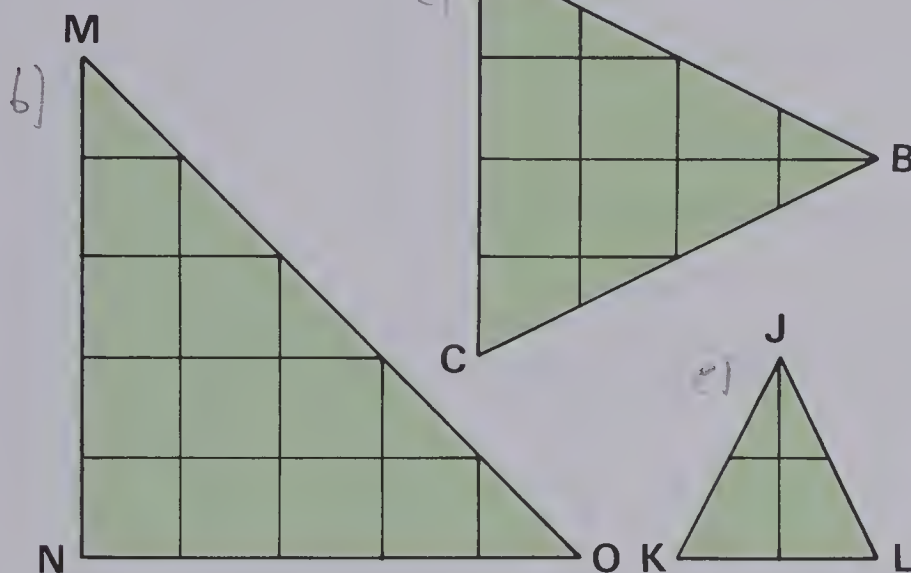
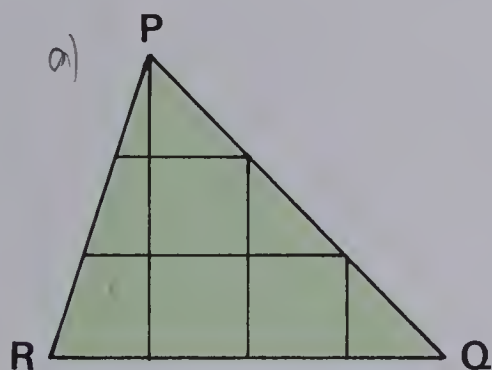
How would you find the area of a triangle?

What is the area of $\triangle XCS$?





1. a) Cut out 2 models of each of the triangles below.
Fit each pair together to form a parallelogram.
- b) Find the area of each parallelogram.
- c) Find the area of each triangle.



2. Trace and cut out a model of $\triangle ABC$.
Draw around it.
Use AC as a flip line and flip the triangle.
Draw around it again.
Use AB as the flip line this time.
Flip the shape and draw around it.
Now use AC as the flip line,
flip the shape and draw around it.
Repeat for a total of 5 flips.
What shape have you formed?
What is its area?

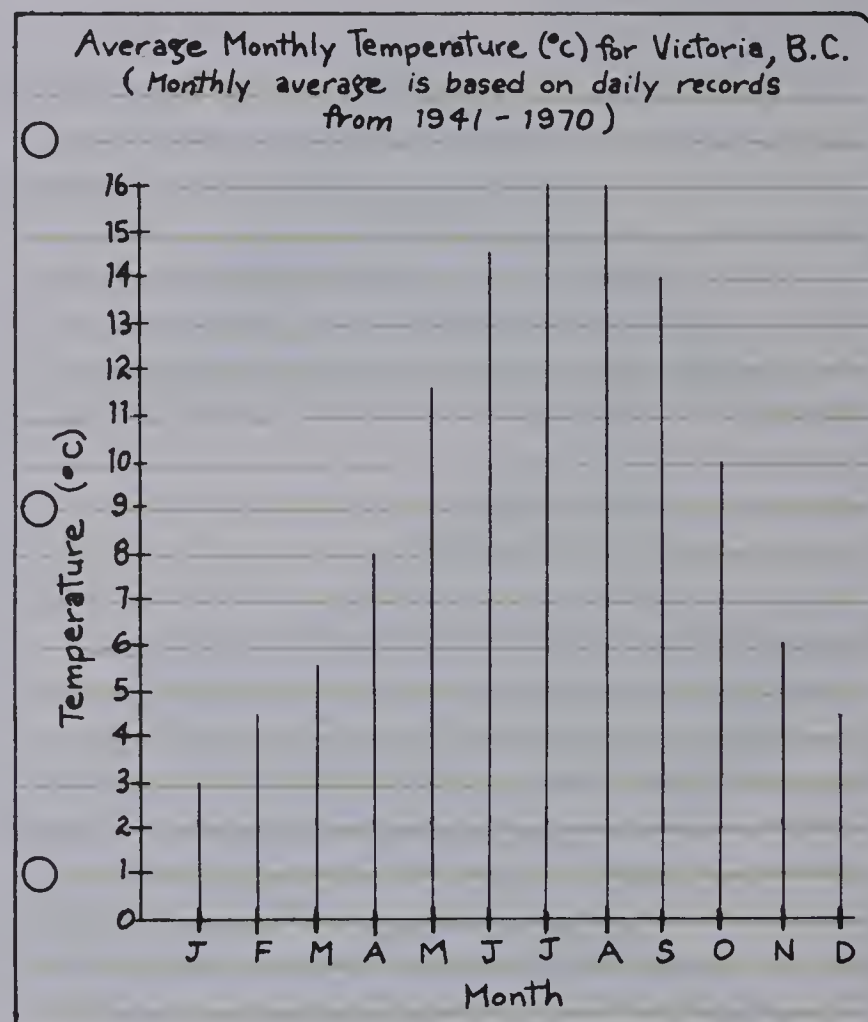
EXPLORE

GRAPHS/The Straight-Line Graph

Check the straight-line graph with the 5 points for good graphing.

1. Good use of space
2. Scales named accurately
3. Neat drawing and printing
4. Descriptive title
5. Data expressed accurately

Month	Temp (°C)	Month	Temp (°C)
J	3	J	16
F	4.5	A	16
M	5.5	S	14
A	8	O	10
M	11.5	N	6
J	14.5	D	4.5



Vertical Scale: 1 unit represents 1°C



1. Draw a straight-line graph showing the average monthly temperature (°C) for Vancouver.

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp. (°C)	2	4.5	5.5	9	12	15	17	17	14.5	10	6	4

Check your graph with the 5 points for good graphing.

2. Practise your skills of good graphing.

Draw a straight-line graph to show the data on the number of various kinds of birds observed at the school feeding station on 1 d in January: sparrows 20; bluejays 5; cardinals 2; starlings 10.

Make up 2 questions about your graph.

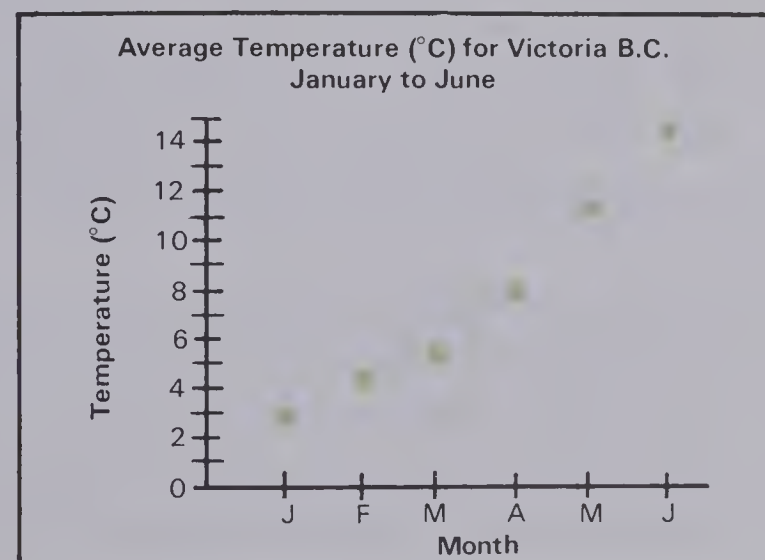
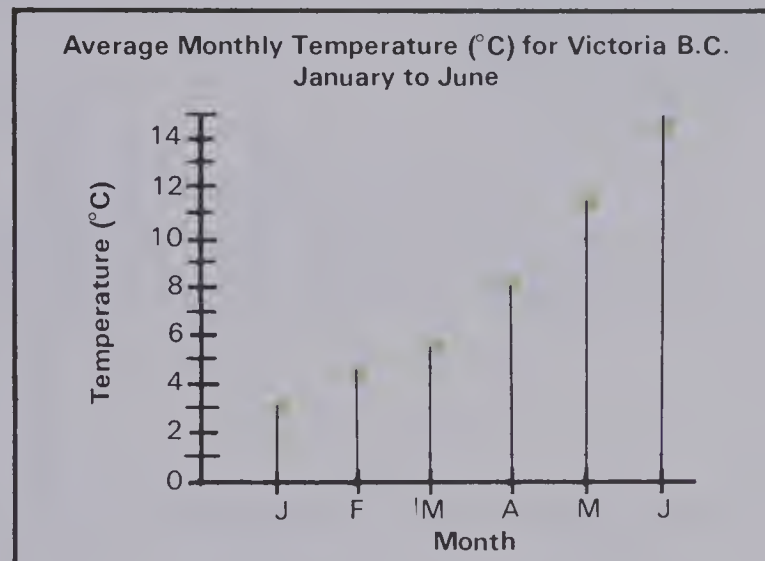
Making a Broken-Line Graph

To make a broken-line graph, mark a dot for the end point of each line segment, but do not draw the line segment.

Chart

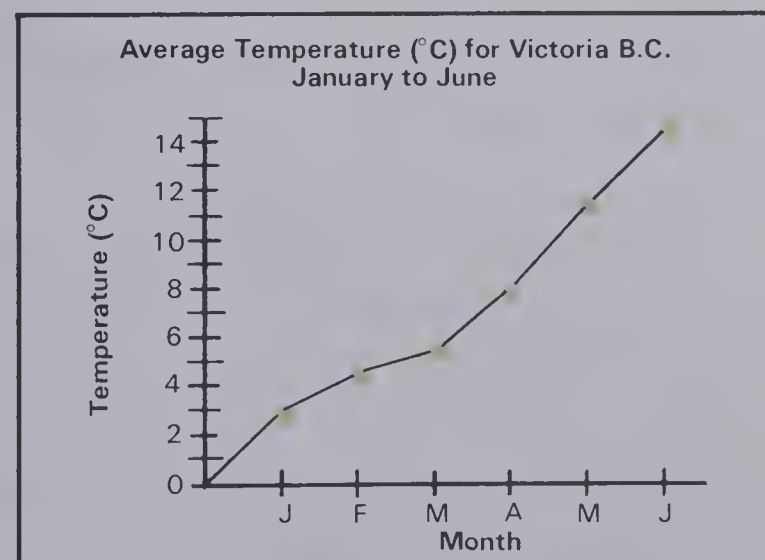
Month	Temp. (°C)
J	3
F	4.5
M	5.5
A	8
M	11.5
J	14.5

1. Look at the chart: Jan. 3°C.
2. Read across the graph to January.
3. Read up the temperature axis to 3°C.
4. Mark the point.



Join the dots with straight lines

- a) What does the broken-line graph suggest is happening to the changes in temperature?
Read the scales.
- b) What is happening to the changes in temperature from January to June?





1. Draw a broken-line graph to show the average monthly temperature of Victoria B.C. from July to December.

Month	J	A	S	O	N	D
Temp. (°C)	16	16	14	10	6	4.5

Ask 2 questions about your graph.

2.
 - a) Draw a broken-line graph for the products 1×2 , 2×2 , 2×3 , 2×4 .
 - b) What can you say about the broken lines?
 - c) What would you expect to happen if the graph were extended to 2×9 ?
 - d) Draw a broken-line graph to show the products 1×3 , 2×3 , 3×3 , 3×4 .
 - e) What might you expect the broken-line graph representing the multiples of any number would show?

3. Janet put \$5.00 into her bank account each month.
In January her bank balance was \$25.00.
 - a) Make a chart of her bank balance from January to September.
 - b) Draw a broken-line graph for your chart.
 - c) Ask 2 questions about your graph.

4. Philip canvassed for new customers for his paper route.

Week	1	2	3	4
Number of new customers	2	3	5	6

- a) Draw 2 broken-line graphs.
 - i) Vertical scale: 1 cm represents 1 new customer
Horizontal scale: 3 cm represent 1 week
 - ii) Vertical scale: 1 cm represents 1 new customer
Horizontal scale: 1 cm represents 1 week
- b) What happens to the broken-line graph when the horizontal scale changes?
- c) Which scale would you use if you wanted to impress people with your sales?

Reading a Broken-Line Graph

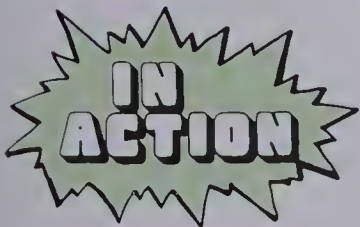
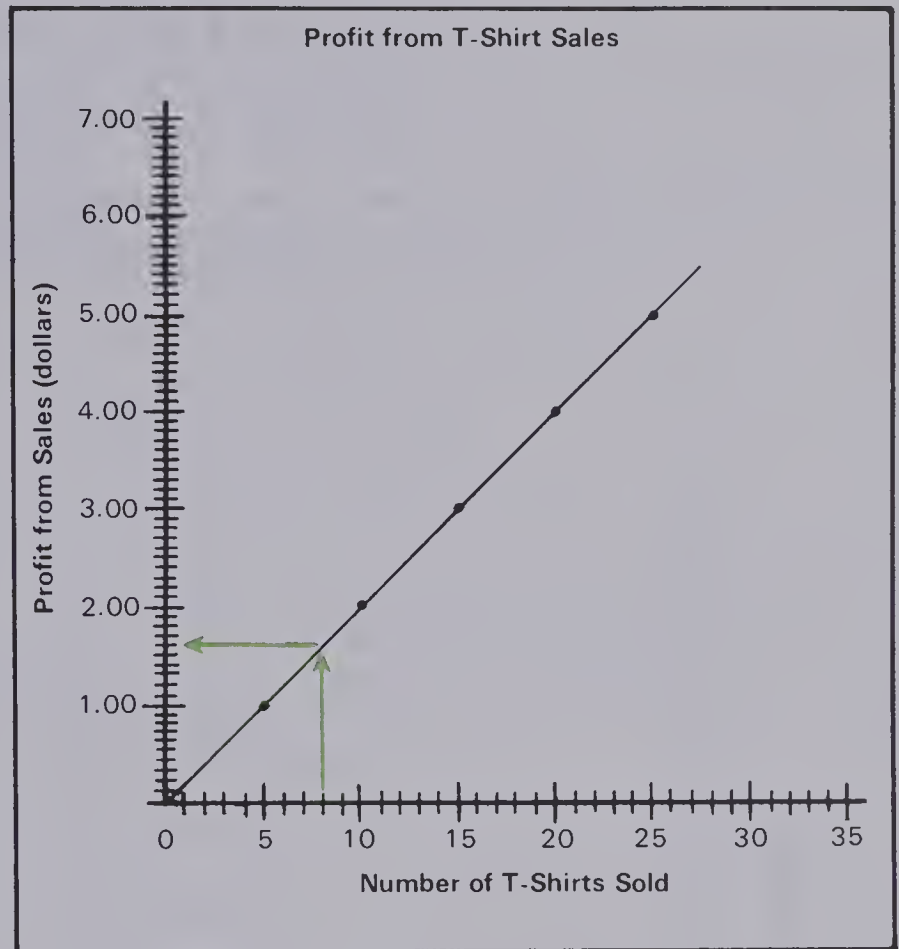
Miss Finlayson's class decided to raise money for a school project by selling school T-shirts. The profit for each shirt is \$0.20.

The students made a broken-line graph to show their profit.

- a) What is the profit from the sale of 8 T-shirts?

Follow the arrows to read the graph.

- b) What is the profit from the sale of 30 T-shirts?
c) How many shirts must be sold to make a profit of \$3.00?
d) How much money will the class make if they sell 35 T-shirts?



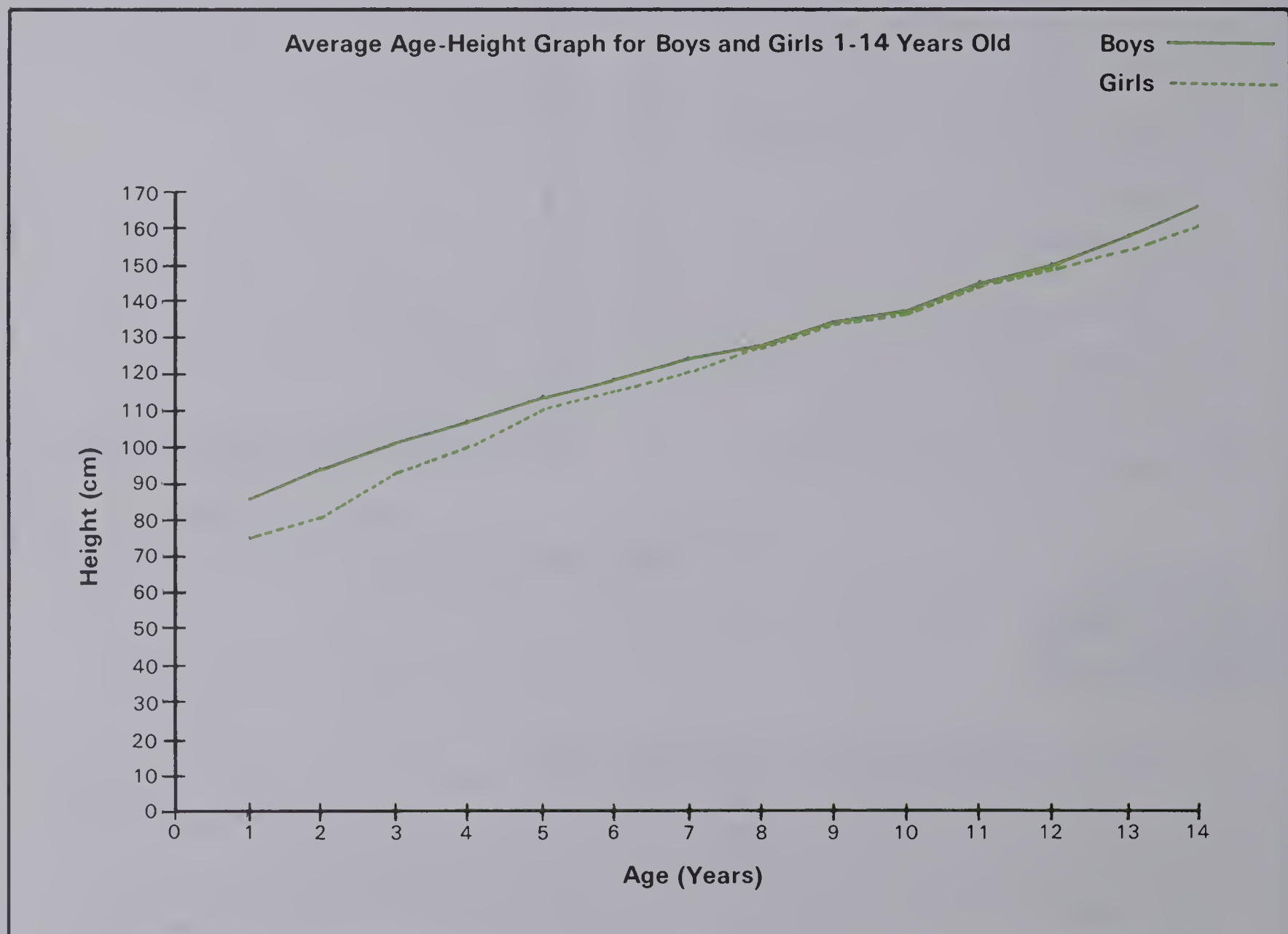
Mr. Garda's class produced a school newspaper once a week for 8 weeks. Each paper sold for 5¢.

Number of week	1	2	3	4	5	6	7	8
Number of papers sold	60	80	90	110	110	100	110	120
Money collected	\$3.00	\$4.00	\$4.50	\$5.50	\$5.50	\$5.00	\$5.50	\$6.00

- a) Draw a broken-line graph to show the number of papers sold each week for 8 weeks.
b) Draw a broken-line graph to show the amount of money made in each week for 8 weeks.

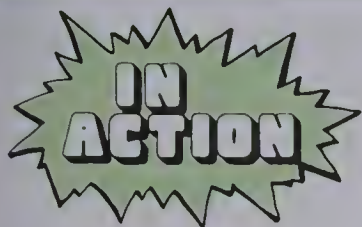
Graphing 2 Sets of Data

We can show 2 sets of data on the same graph
It is a useful method of illustrating a comparison
of facts and predicting trends

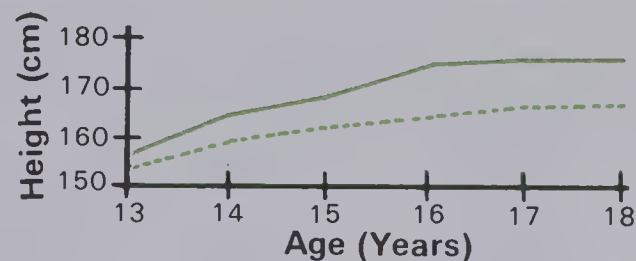


What is the difference in average height for boys and girls at age 1?
At what age does the graph indicate the greatest difference in height?
What is the first year that boys and

girls appear to have the same height?
What do you observe about the average heights of boys and girls at age 12? at age 13?
What would you predict for the average height of boys and girls for the ages 13 to 18?



1. Here is a section of the Average Age-Height graph for boys and girls 13 to 18 years of age.



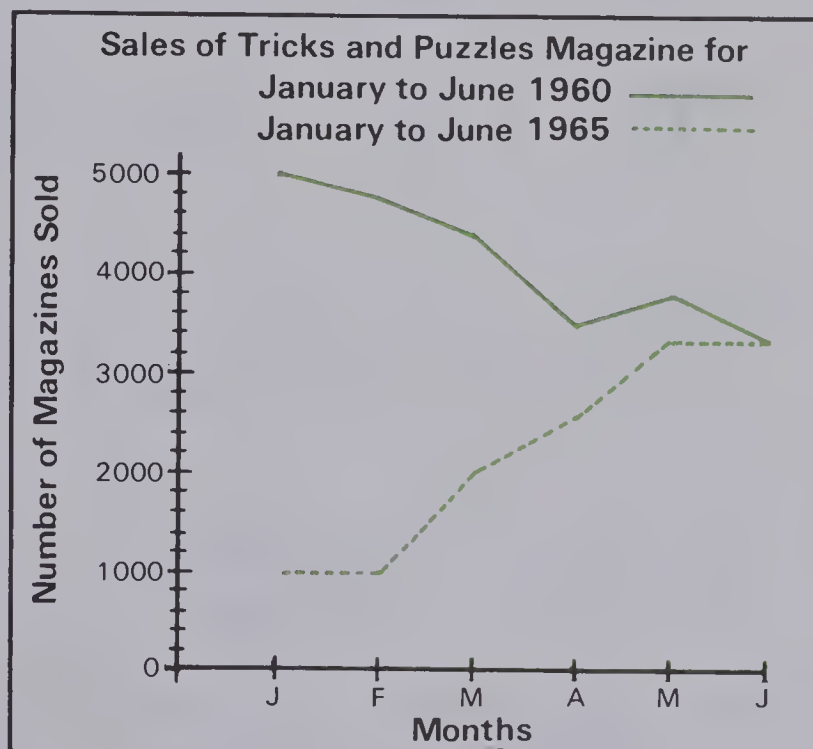
a) At which age does it appear that there is the greatest difference in height between boys and girls?

b) At which age does the graph indicate the least difference in height between boys and girls?

c) What appears to happen between ages 16 and 18?

d) What do you predict will happen after age 18?

2. a) Describe the sales for 1960.
 b) Describe the sales for 1965.
 c) What is the difference between the sales in January 1960 and the sales in January 1965?
 d) In which month were sales the same in 1960 and 1965?
 e) If the magazine sold for \$1.00, what were the total sales for February 1960 and February 1965?



3. Draw a broken-line graph for this Average Body Mass data. Ask 4 questions about the information presented on your graph. Write the answers you would expect for your questions.

Average mass in kilograms for boys	3	10	13	15	17	18	21	23	25	27	30	33	37	42	49	55	59	62	63
Average mass in kilograms for girls	3	10	13	15	17	18	21	23	25	28	31	35	41	46	51	54	56	57	57
Age in years	birth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Unit 2, Check 1

Check your progress. The answers are on page 182.

1. Add.

a) 436 284 169 <u>870</u>	b) 256 934 1268 <u>5307</u>	c) \$1946 3830 2009 <u>1708</u>	d) \$14.76 8.39 5.48 <u>0.68</u>	e) 64.3 82.6 0.4 <u>20.7</u>	f) 15.46 9.81 4.06 <u>17.69</u>	g) 1.046 0.693 9.504 <u>2.240</u>
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2. Subtract.

a) 6438 <u>2427</u>	b) 1648 <u>1537</u>	c) \$5964 <u>3867</u>	d) \$8707 <u>5964</u>	e) 38.04 <u>21.87</u>	f) 600.9 <u>483.7</u>	g) 9.108 <u>4.649</u>
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3. Multiply.

a) 623 <u>8</u>	b) 496 <u>7</u>	c) \$849 <u>9</u>	d) 43.6 <u>12</u>	e) 894 <u>5.8</u>	f) 36.4 <u>8.1</u>	g) 75.8 <u>0.84</u>
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4. Divide.

a) 1800 by 100	b) 600 by 30	c) 1340 by 10	d) 1200 by 400	e) 521 by 100
f) 81 by 100	g) 720 by 90	h) 160 by 40	i) 14.8 by 10	j) 304 by 1000

5. Divide.

a) 228 by 6	b) 297 by 9	c) 776 by 8	d) 424 by 8	e) 568 by 8
f) 3484 by 4	g) 1563 by 3	h) 1140 by 5	i) 1424 by 4	j) 3036 by 6

6. Find the quotients.

a) $10 \overline{) 140}$	b) $13 \overline{) 676}$	c) $23 \overline{) 437}$	d) $15 \overline{) 1215}$	e) $29 \overline{) 1044}$
f) $14 \overline{) 1232}$	g) $21 \overline{) 1302}$	h) $28 \overline{) 868}$	i) $17 \overline{) 1088}$	j) $24 \overline{) 888}$

7. Find.

a) $64.4 \div 14$	b) $86.1 \div 21$	c) $78.3 \div 27$	d) $38.4 \div 16$	e) $50.4 \div 18$
f) $16.72 \div 22$	g) $7.65 \div 15$	h) $1.225 \div 25$	i) $158.6 \div 29$	j) $1.378 \div 26$
k) $32.67 \div 27$	l) $1.292 \div 19$	m) $313.3 \div 13$	n) $35.19 \div 23$	o) $73.44 \div 17$

8. If 25 rulers have a total mass of 112.5 g, what is the mass of 1 ruler?

Unit 2, Practice 1

1. Add.

a) 356 432 890 <u>138</u>	b) 174 283 9 064 <u>1 006</u>	c) \$1492 250 874 <u>3970</u>	d) \$ 2.16 12.83 40.71 <u>3.07</u>	e) 38.5 17.4 33.6 <u>19.7</u>	f) 1.48 0.61 3.50 <u>8.19</u>	g) 0.921 4.068 7.433 <u>2.087</u>
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2. Subtract.

a) 4963 <u>1987</u>	b) 9064 <u>7728</u>	c) \$1972 <u>1483</u>	d) \$20.79 <u>18.39</u>	e) 82.07 <u>46.89</u>	f) 423.7 <u>196.0</u>	g) 5.400 <u>1.739</u>
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3. Multiply.

a) 738 <u>7</u>	b) 381 <u>9</u>	c) \$530 <u>6</u>	d) 2.98 <u>18</u>	e) 764 <u>4.6</u>	f) 34.5 <u>8.3</u>	g) 97.1 <u>0.65</u>
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4. Find.

a) $1700 \div 10$	b) $600 \div 100$	c) $800 \div 40$	d) $1200 \div 300$	e) $831 \div 100$
f) $76 \div 10$	g) $12.50 \div 10$	h) $1.50 \div 10$	i) $2800 \div 700$	j) $6300 \div 90$

5. Divide.

a) 138 by 6	b) 375 by 5	c) 568 by 8	d) 872 by 2	e) 414 by 9
f) 152 by 4	g) 399 by 7	h) 363 by 3	i) 288 by 9	j) 516 by 6

6. Find the quotients.

a) $10 \overline{)230}$	b) $14 \overline{)574}$	c) $21 \overline{)294}$	d) $18 \overline{)594}$	e) $27 \overline{)486}$
f) $13 \overline{)754}$	g) $29 \overline{)493}$	h) $16 \overline{)752}$	i) $23 \overline{)529}$	j) $15 \overline{)375}$

7. Find.

a) $24.7 \div 13$	b) $2.94 \div 21$	c) $6.48 \div 12$	d) $39.6 \div 18$	e) $6.46 \div 17$
f) $38.4 \div 24$	g) $9.52 \div 28$	h) $13.44 \div 16$	i) $117.6 \div 21$	j) $11.34 \div 14$
k) $22.95 \div 15$	l) $181.7 \div 23$	m) $7.125 \div 19$	n) $8.126 \div 17$	o) $68.58 \div 27$

8. An auditorium seats 792 people. There are 24 rows of seats.
How many seats are in each row?

Unit 2, Check 2

Check your progress. The answers are on page 182.

1. Round each number to the nearest tenth.

- a) 4.51 b) 19.56 c) 37.49 d) 181.54 e) 3.86 f) 0.37
g) 1.82 h) 4.75 i) 16.451 j) 10.99 k) 0.15 l) 7.055

2. Express the quotient to the nearest tenth.

- a) $23.00 \div 12$ b) $41.00 \div 17$ c) $32 \div 21$ d) $624 \div 27$ e) $387 \div 16$
f) $240 \div 23$ g) $56.4 \div 19$ h) $4.13 \div 27$ i) $24.81 \div 13$ j) $7.43 \div 15$
k) $3.876 \div 22$ l) $187.4 \div 24$ m) $437.8 \div 11$ n) $84.61 \div 25$ o) $247 \div 14$
p) $7.364 \div 29$ q) $3.814 \div 16$ r) $54.76 \div 26$ s) $67.84 \div 17$ t) $55.38 \div 28$

3. Divide. Express the quotient to the nearest tenth.

- a) 241 by 0.4 b) 356 by 0.5 c) 728 by 0.9 d) 564 by 0.8 e) 420 by 0.7
f) 362 by 1.6 g) 43 by 3.2 h) 79 by 4.2 i) 38 by 0.21 j) 71 by 0.17
k) 34.3 by 1.2 l) 8.4 by 1.7 m) 7.4 by 0.4 n) 0.41 by 0.7 o) 1.00 by 0.3
p) 2 by 0.07 q) 34.1 by 0.06 r) 4.063 by 0.04 s) 7.137 by 0.06 t) 9.632 by 2.4

4. Tanya had 30 hockey cards.

She now has 0.2 times more cards.
How many does she now have?

5. Chris used 200 ml of flour.

Another time, he used 0.3 times more.
How many millilitres of flour
did he use the second time?

6. The length of a book is 24.5 cm;
the width is 21 cm.

What is the perimeter?

7. A board is 229.4 cm long.

Into how many pieces, each 6.2 cm long,
can the board be divided?

8. A container has a capacity of 319.8 ml of liquid.
A smaller container holds 12.3 ml.
How many times could you fill the smaller
container from the larger?

9. Eric ran 800 m.
Vicki ran 0.4 times further.
How far did Vicki run?



Unit 2, Practice 2

1. Round each number to the nearest tenth

a) 12.68 b) 121.53 c) 4.76 d) 9.84 e) 0.35 f) 7.96
g) 24.09 h) 6.45 i) 29.99 j) 18.854 k) 0.05 l) 121.056

2. Express the quotient to the nearest tenth.

a) $42.00 \div 12$ b) $37.00 \div 17$ c) $41 \div 23$ d) $83 \div 29$ e) $237 \div 15$
f) $640 \div 11$ g) $3.51 \div 13$ h) $7.64 \div 21$ i) $18.2 \div 27$ j) $54.1 \div 18$
k) $3.812 \div 14$ l) $22.46 \div 28$ m) $8.125 \div 16$ n) $7.13 \div 22$ o) $87.4 \div 14$
p) $53.6 \div 24$ q) $6.243 \div 26$ r) $19.89 \div 19$ s) $25.75 \div 25$ t) $2.374 \div 23$

3. Express the quotient to the nearest tenth.

a) $36 \div 0.7$ b) $52 \div 0.9$ c) $84 \div 0.8$ d) $47 \div 0.5$ e) $29 \div 0.4$
f) $41 \div 1.7$ g) $26 \div 1.5$ h) $83 \div 2.1$ i) $77 \div 3.2$ j) $58 \div 2.3$
k) $14.6 \div 1.3$ l) $28.7 \div 2.8$ m) $3.41 \div 1.5$ n) $6.136 \div 0.8$ o) $40.7 \div 2.8$
p) $1.84 \div 0.24$ q) $7.06 \div 0.17$ r) $1 \div 0.32$ s) $7 \div 0.5$ t) $0.84 \div 0.19$

4. The length of a room is 10 m.

The width is 0.5 times the length.

What is the width of the room?

5. The diameter of a 1 cent piece is 1.9 cm.

A row of 1 cent pieces measures 81.7 cm.

How many 1 cent pieces are in the row?

6. A taxi travels 160.5 km in 1 d.

If it travels the same distance each day,

how far will it travel in 6 d?

7. A plastic bottle contains 500 ml of handcream.

If 1.5 ml is dispensed in 1 squeeze,

how many times will the bottle dispense the handcream?

8. Angelo has a mass of 40 kg.

Ursula's mass is 0.2 times less than Angelo's.

What is Ursula's mass?

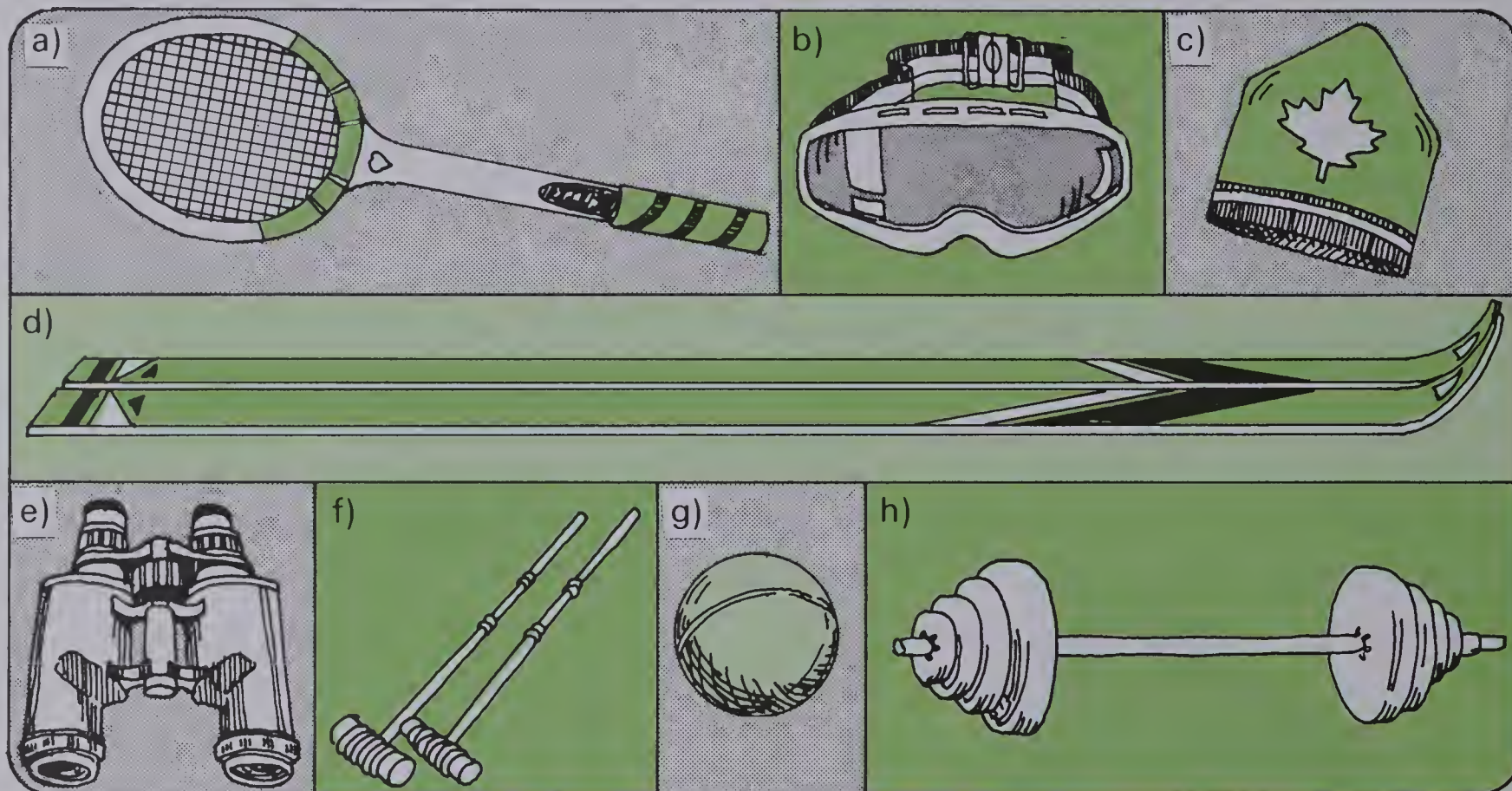
9. A bolt of cloth 34.5 m long is cut into 100 equal pieces.

What is the length of each piece?

Unit 2, Check 3

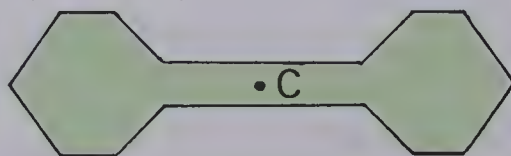
Check your progress. The answers are on pages 182–183.

We find symmetry in sports equipment.



1. How many lines of symmetry can you find in each picture?
2. Name other pieces of sports equipment that have lines of symmetry.
How many lines of symmetry?

3. Trace this shape.



Turn the shape about the turn centre, C.

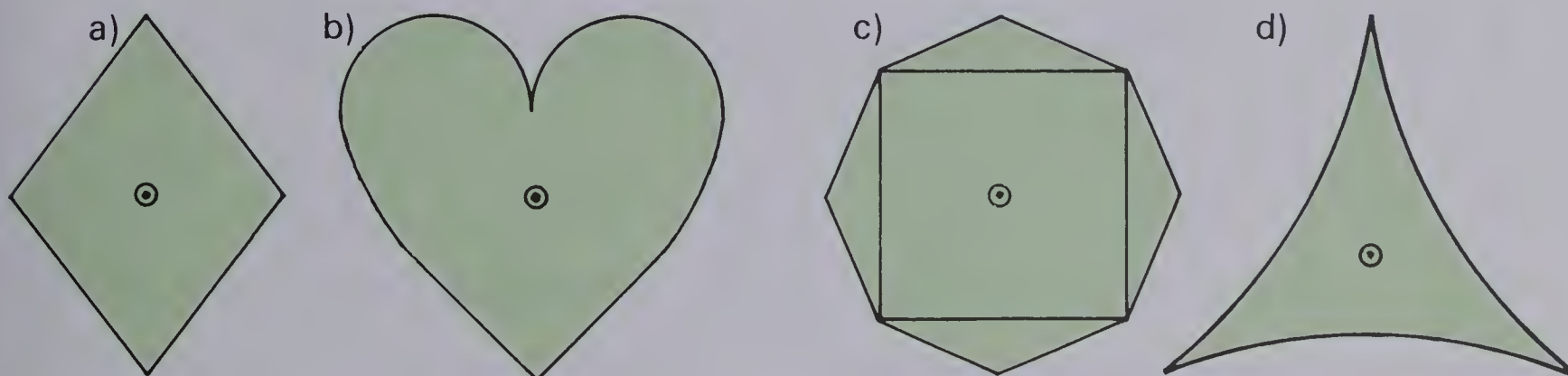
- a) Through how many degrees must you rotate your tracing before it matches the original shape?
 - b) What is the order of rotational symmetry for this shape?
4. List the factors of a) 15 b) 17 c) 22 d) 25 e) 30 f) 48 g) 72
 5. Use a tree diagram to find the prime factors.

a) 9	b) 13	c) 34	d) 51	e) 44	f) 56
g) 74	h) 92	i) 100	j) 121	k) 132	l) 140

Unit 2, Practice 3

- Name 2 symmetrical objects that may be found
 - in a kitchen
 - in a workshop
 - in a living room
 - in a classroom

- What is the order of rotational symmetry for each shape?



- Find the composite number for each tree diagram.

a) $c = ?$



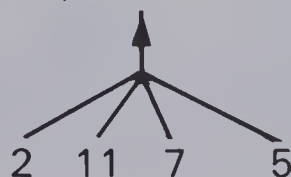
b) $c = ?$



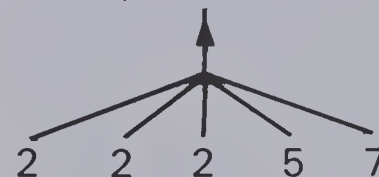
c) $c = ?$



d) $c = ?$



e) $c = ?$



- Find the prime factorization of each composite number.

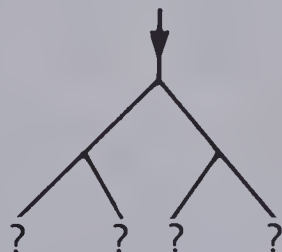
a) 21



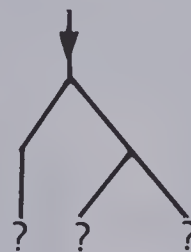
b) 44



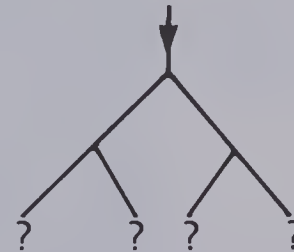
c) 16



d) 18



e) 126



f) 26

g) 76

h) 140

i) 32

j) 80

k) 132

l) 162

m) 110

- Find the set of factors of

a) 8 b) 15 c) 27 d) 34 e) 52 f) 63 g) 72 h) 80 i) 95 j) 112

- Find the GCF of

a) 6, 12 b) 12, 16 c) 10, 40 d) 15, 40 e) 27, 54
 f) 36, 48 g) 24, 72 h) 56, 64 i) 90, 120 j) 86, 114

Unit 2, Check 4

Check your progress. The answers are on page 183.

1. Complete.

a) $\frac{2}{10} = \frac{?}{5}$ b) $\frac{?}{4} = \frac{6}{8}$ c) $\frac{40}{?} = \frac{4}{10}$ d) $\frac{2}{2} = \frac{8}{?}$ e) $\frac{2}{10} = \frac{?}{100}$
 f) $\frac{25}{100} = \frac{1}{?}$ g) $\frac{6}{?} = \frac{12}{10}$ h) $\frac{8}{?} = \frac{4}{5}$ i) $\frac{12}{10} = \frac{6}{?}$ j) $\frac{?}{10} = \frac{200}{100}$

2. Write the least-terms fraction for each.

a) $\frac{6}{4}$ b) $\frac{3}{8}$ c) $\frac{2}{4}$ d) $\frac{4}{10}$ e) $\frac{6}{8}$ f) $\frac{8}{10}$ g) $\frac{70}{100}$ h) $\frac{20}{100}$
 i) $\frac{4}{8}$ j) $\frac{3}{2}$ k) $\frac{12}{8}$ l) $\frac{75}{100}$ m) $\frac{10}{4}$ n) $\frac{50}{100}$ o) $\frac{15}{10}$ p) $\frac{110}{100}$

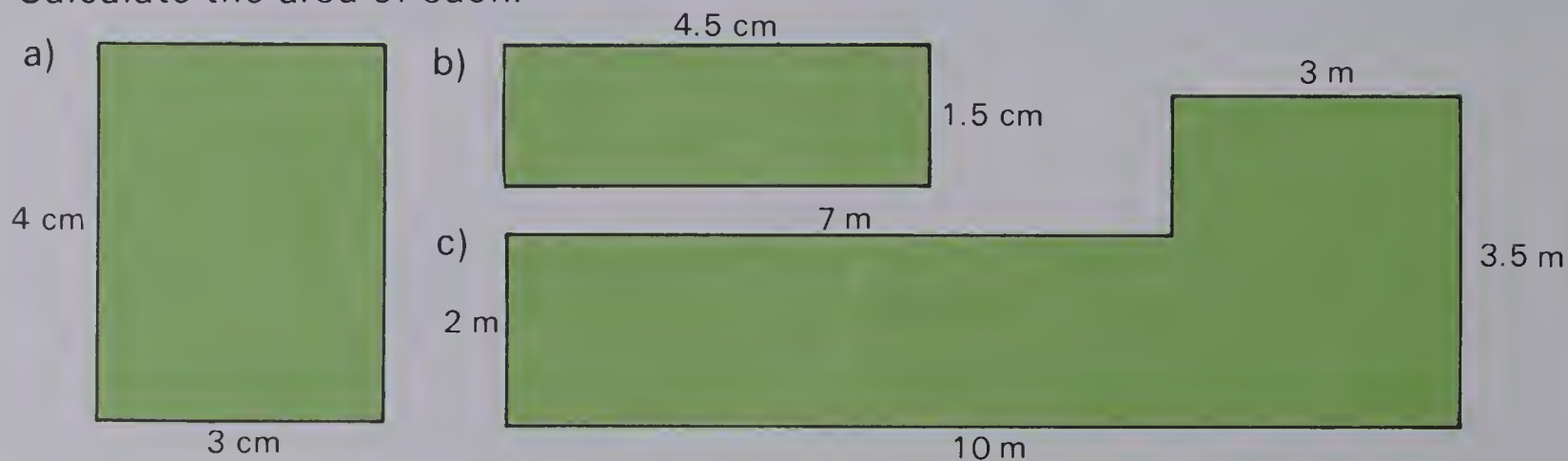
3. Write the 2 meanings for each fraction.

a) $\frac{2}{5}$ b) $\frac{3}{4}$ c) $\frac{2}{10}$ d) $\frac{1}{2}$ e) $\frac{5}{4}$ f) $\frac{6}{5}$ g) $\frac{17}{10}$ h) $\frac{20}{100}$

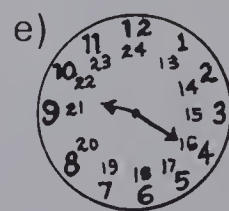
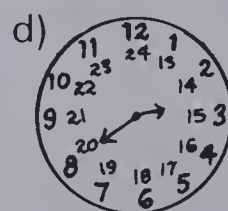
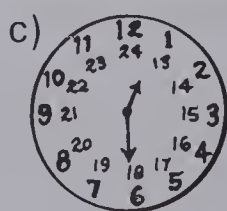
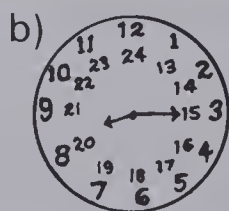
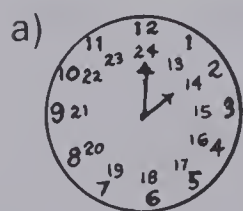
4. Express as a decimal.

a) $\frac{3}{5}$ b) $\frac{2}{4}$ c) $\frac{11}{10}$ d) $\frac{28}{100}$ e) $\frac{4}{8}$ f) $\frac{7}{5}$ g) $\frac{4}{2}$ h) $\frac{8}{5}$

5. Calculate the area of each.



6. Show how each of the following times is written and read.



Unit 2, Practice 4

1. Complete.

a) $\frac{1}{5} = \frac{2}{?}$

b) $\frac{3}{?} = \frac{30}{100}$

c) $\frac{?}{4} = \frac{6}{8}$

d) $\frac{3}{2} = \frac{?}{8}$

e) $\frac{3}{5} = \frac{?}{100}$

2. Write the least-term fraction for each.

a) $\frac{90}{100}$

b) $\frac{25}{10}$

c) $\frac{20}{8}$

d) $\frac{7}{5}$

e) $\frac{14}{8}$

f) $\frac{35}{10}$

g) $\frac{30}{100}$

h) $\frac{14}{4}$

3. Express as a decimal.

a) $\frac{4}{5}$

b) $\frac{6}{10}$

c) $\frac{3}{8}$

d) $\frac{3}{4}$

e) $\frac{35}{100}$

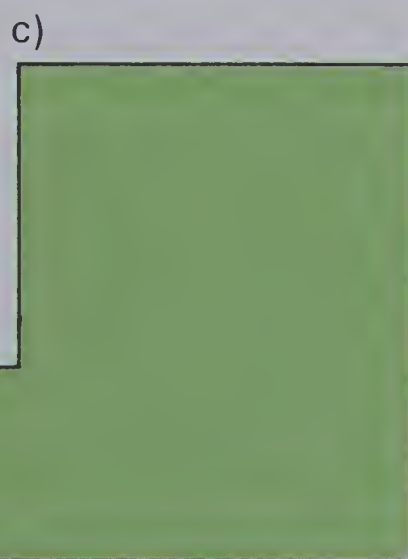
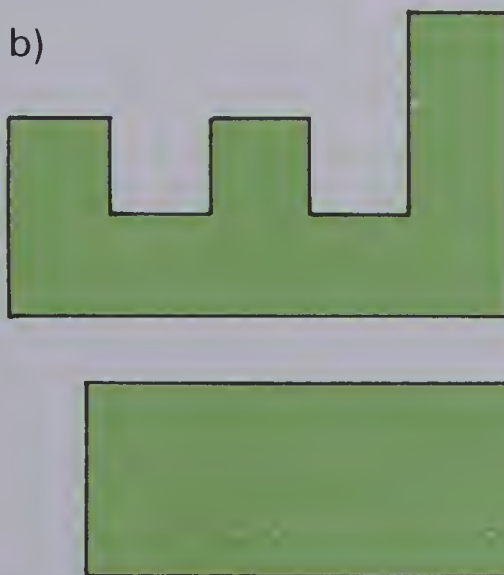
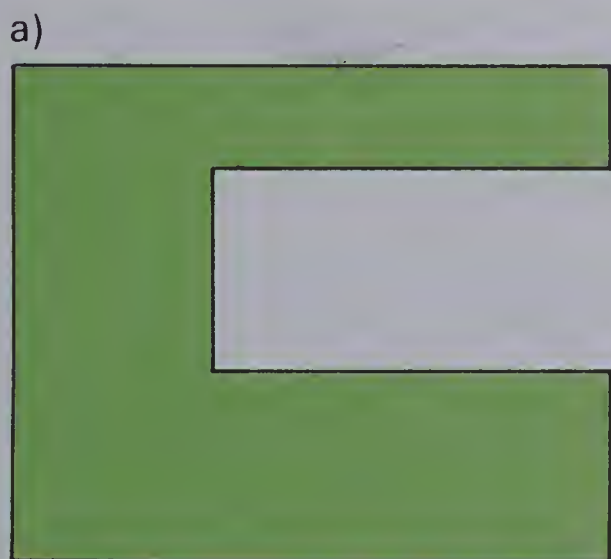
f) $\frac{19}{10}$

g) $\frac{7}{5}$

h) $\frac{9}{4}$

4. Draw a rectangular shape with an area of a) 15 cm^2 b) 22.5 cm^2 .

5. Calculate the area of each region.



6. Draw clocks to show

a) 02:15

b) 23:45

c) 12:00

d) 24:00.

7.

RAILINER		
Daily	km	Eastern Time
23:10	0dp	Toronto, Ont.
23:23	8	West Toronto
23:28	14	Weston
	25	Malton
23:45	34	Brampton
23:56	47	Georgetown
00:24	79	Guelph
00:48	101	Kitchener
01:20	143	Stratford

a) Draw a clock to show the departure time from Toronto.

b) Draw a clock to show the arrival time in Stratford.

c) What is the length of time to travel from Toronto to Stratford?

d) Write in words the arrival time in Brampton.

e) Write in words the arrival time in Kitchener.

Answers Unit 2, Check 1

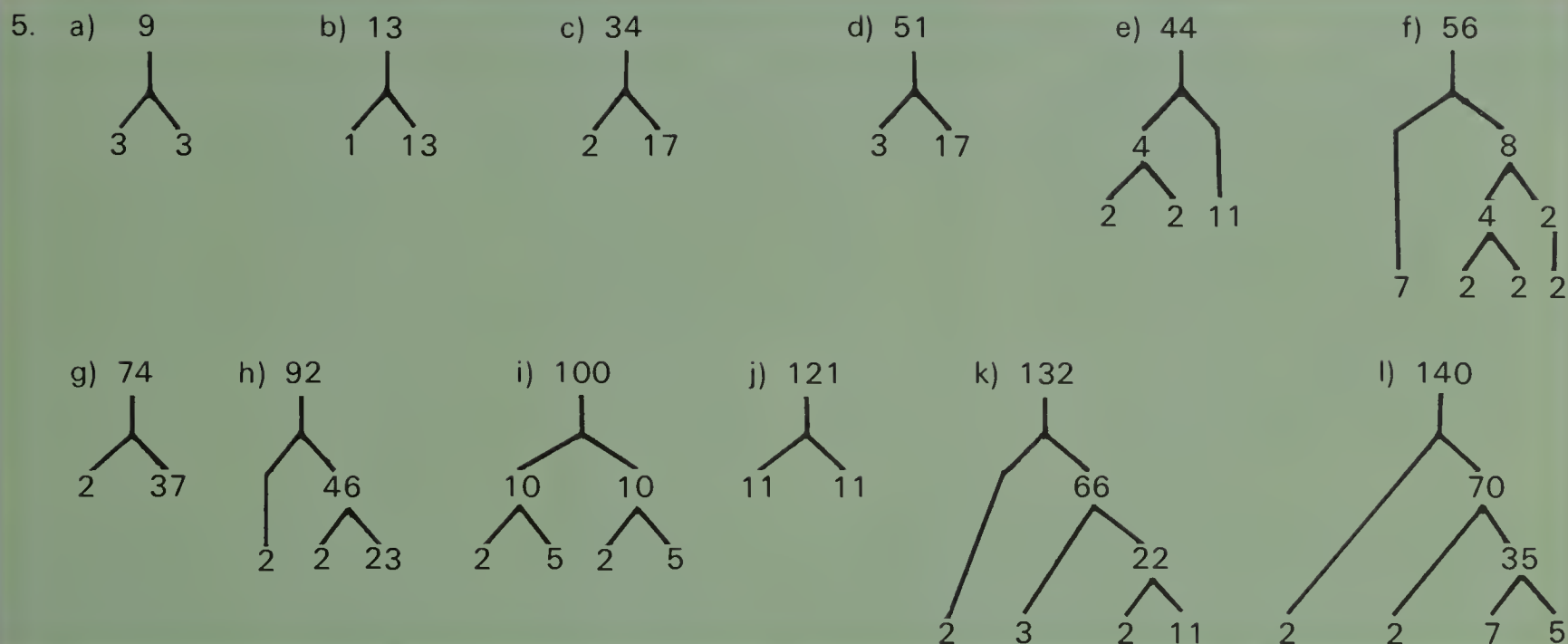
1. a) 1759 b) 7765 c) \$9493 d) \$29.31 e) 168.0 f) 47.02 g) 13.483
2. a) 4011 b) 111 c) \$2097 d) \$2743 e) 16.17 f) 117.2 g) 4.459
3. a) 4984 b) 3472 c) \$7641 d) 523.2 e) 5185.2 f) 294.84 g) 63.672
4. a) 18 b) 20 c) 134 d) 3 e) 5.21 f) 0.81 g) 8 h) 4 i) 1.48 j) 0.304
5. a) 38 b) 33 c) 97 d) 53 e) 71 f) 871 g) 521 h) 228 i) 356 j) 506
6. a) 14 b) 52 c) 19 d) 81 e) 36 f) 88 g) 62 h) 31 i) 64 j) 37
7. a) 4.6 b) 4.1 c) 2.9 d) 2.4 e) 2.8 f) 0.76 g) 0.51 h) 0.049 i) 5.47
j) 0.053 k) 1.21 l) 0.068 m) 24.1 n) 1.53 o) 4.32
8. 4.5 g

Answers Unit 2, Check 2

1. a) 4.5 b) 19.6 c) 37.5 d) 181.5 e) 3.9 f) 0.4 g) 1.8 h) 4.8 i) 16.5
j) 11.0 k) 0.2 l) 7.1
2. a) 1.9 b) 2.4 c) 1.5 d) 23.1 e) 24.2 f) 10.4 g) 3.0 h) 0.2 i) 1.9 j) 0.5
k) 0.2 l) 7.8 m) 39.8 n) 3.4 o) 17.6 p) 0.2 q) 0.2 r) 2.1 s) 4.0 t) 2.0
3. a) 602.5 b) 712.0 c) 808.9 d) 705.0 e) 600.0 f) 226.2 g) 13.4 h) 18.8
i) 181.0 j) 417.6 k) 28.6 l) 4.9 m) 18.5 n) 0.6 o) 3.3 p) 28.6
q) 568.3 r) 101.6 s) 119.0 t) 4.0
4. 36 cards 5. 260 ml 6. 91 cm 7. 37 pieces 8. 26 times 9. 1120 m or 1.12 km

Answers Unit 2, Check 3

1. a) 1 b) 1 c) 1 d) 1 e) 2 f) 2 g) infinite number h) 1
2. Answers will vary
3. a) 180° b) 2
4. a) 1, 5, 3, 15 b) 1, 17 c) 1, 22, 11, 2 d) 1, 25, 5
e) 1, 30, 2, 15, 3, 10, 5, 6 f) 1, 48, 2, 24, 3, 16, 4, 12, 6, 8
g) 1, 72, 2, 36, 3, 24, 4, 18, 6, 12, 8, 9



Answers Unit 2, Check 4

1. a) $\frac{1}{5}$ b) $\frac{3}{4}$ c) $\frac{40}{100}$ d) $\frac{8}{8}$ e) $\frac{20}{100}$ f) $\frac{1}{4}$ g) $\frac{6}{5}$ h) $\frac{8}{10}$ i) $\frac{6}{5}$ j) $\frac{20}{10}$

2. a) $\frac{3}{2}$ b) $\frac{3}{8}$ c) $\frac{1}{2}$ d) $\frac{2}{5}$ e) $\frac{3}{4}$ f) $\frac{4}{5}$ g) $\frac{7}{10}$ h) $\frac{1}{5}$ i) $\frac{1}{2}$ j) $\frac{3}{2}$

k) $\frac{3}{2}$ l) $\frac{3}{4}$ m) $\frac{5}{2}$ n) $\frac{1}{2}$ o) $\frac{3}{2}$ p) $\frac{11}{10}$

3. a) 5 equal parts ; $2 \div 5$
2 parts are considered

b) 4 equal parts ; $3 \div 4$
3 parts are considered

c) 10 equal parts ; $2 \div 10$
2 parts are considered

d) 2 equal parts ; $1 \div 2$
1 part is considered

e) 4 equal parts ; $5 \div 4$
5 parts are considered

f) 5 equal parts ; $6 \div 5$
6 parts are considered

g) 10 equal parts ; $17 \div 10$
17 parts are considered

h) 100 equal parts ; $20 \div 100$
20 parts are considered

4. a) 0.6 b) 0.5 c) 1.1 d) 0.28 e) 0.5 f) 1.4 g) 2.0 h) 1.6

5. a) 12 cm^2 b) 6.75 cm^2 c) 24.5 cm^2

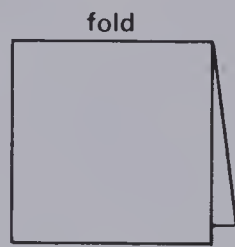
6. a) 02:00 two hours b) 08:15 eight fifteen c) 12:30 twelve thirty d) 14:40 fourteen forty e) 21:20 twenty-one twenty



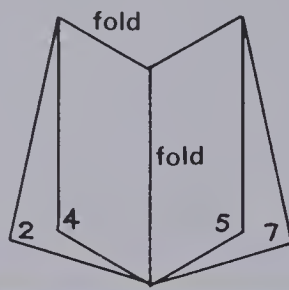
Mysterious Number Patterns

Number Patterns in Paper-Folding

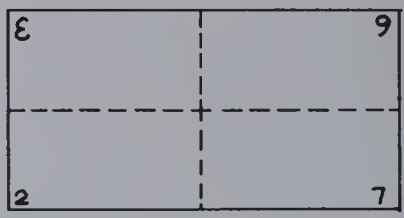
Fold a piece of paper in half.



Fold in half again at right angles to the first fold to form a book.



Number the pages from 1 to 8 in the lower corners.



Open the paper and you will see 4 corner numerals on each side. There are 2 horizontal pairs and 2 vertical pairs. Make a chart and record your results.

Numbered pages	Sum of horizontal pairs	Sum of vertical pairs	Total of the 2 vertical sums
8			

Now repeat the procedure using 2 pieces of paper and numbering the pages from 1 to 16.

Record your results and continue the chart for 3 pages numbering from 1 to 24 and for 4 pages numbering from 1 to 32.

Look for number patterns.
What is the number pattern for the set of horizontal sums?
What are the number patterns for the set of vertical sums?

What is the number pattern for the set of totals of the 2 vertical sums?

Consider the number of pages and the horizontal sum. What is the pattern?

Consider the number of pages and the total of the 2 vertical sums. What is the pattern?

Can you find any other patterns?

Can you explain the reason for any of the patterns?

Consider the horizontal pairs. List the sums.

Write the numerals in a row:
1 2 3 4 5 6 7 8.

Use arcs to show the appropriate pairs.



EXPLORE

RATIO/Making Comparisons



For the pattern, we can compare the number of coloured tiles to the number of white tiles this way:

For every 2 coloured tiles there are 10 white tiles.

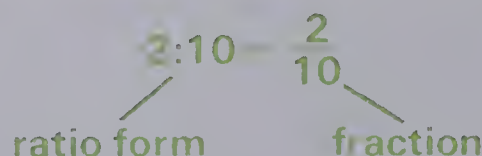
OR

The number of coloured tiles to the number of white tiles is 2 to 10.

OR

The **ratio** of coloured tiles to white tiles is 2:10,
where 2:10 means 2 to 10.

We can write the ratio as a fraction.



The **terms** of the ratio are 2 and 10.

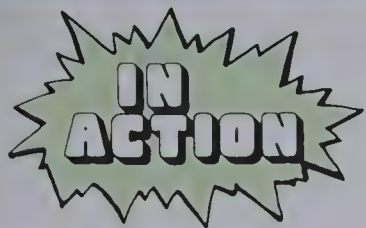
A ratio may have more than 2 terms.

If there are 15 girls,
12 boys, and 1 teacher in the room,
the ratio of girls to boys to teacher is 15:12:1.
15:12:1 is a 3-term ratio.

However, 2-term ratios are most common
and it is convenient to
express them as fractions.

The odds of Southvale school winning
the swimming meet are 3 to 5.

The chance of Sinker pitching a no-hitter is 1 in 1000.
What is the ratio? What is the fraction?



1. Complete.

Comparison	Ratio form	Fraction
3 to 4		
9 out of 10		
	1:10	
		$\frac{3}{5}$
7 to 100		

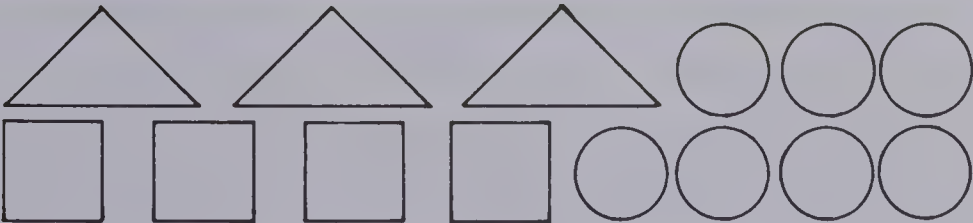
2. The chart shows the record of 5 hockey teams for 15 games.

Team	Won	Lost	Tied
Falcons	11	3	1
Hawks	9	4	2
Eagles	7	5	3
Owls	6	7	2
Gulls	5	5	5

Complete the table of ratios.

Team	Games won to games played	Games lost to games played	Games won to games lost	Games tied to games played	Games lost to games tied
Falcons					
Hawks					
Eagles					
Owls					
Gulls					

3. What is the ratio of
- a) triangles to squares
 - b) squares to circles
 - c) triangles to squares to circles?





A Ratio Expressed as a Least-Terms Fraction

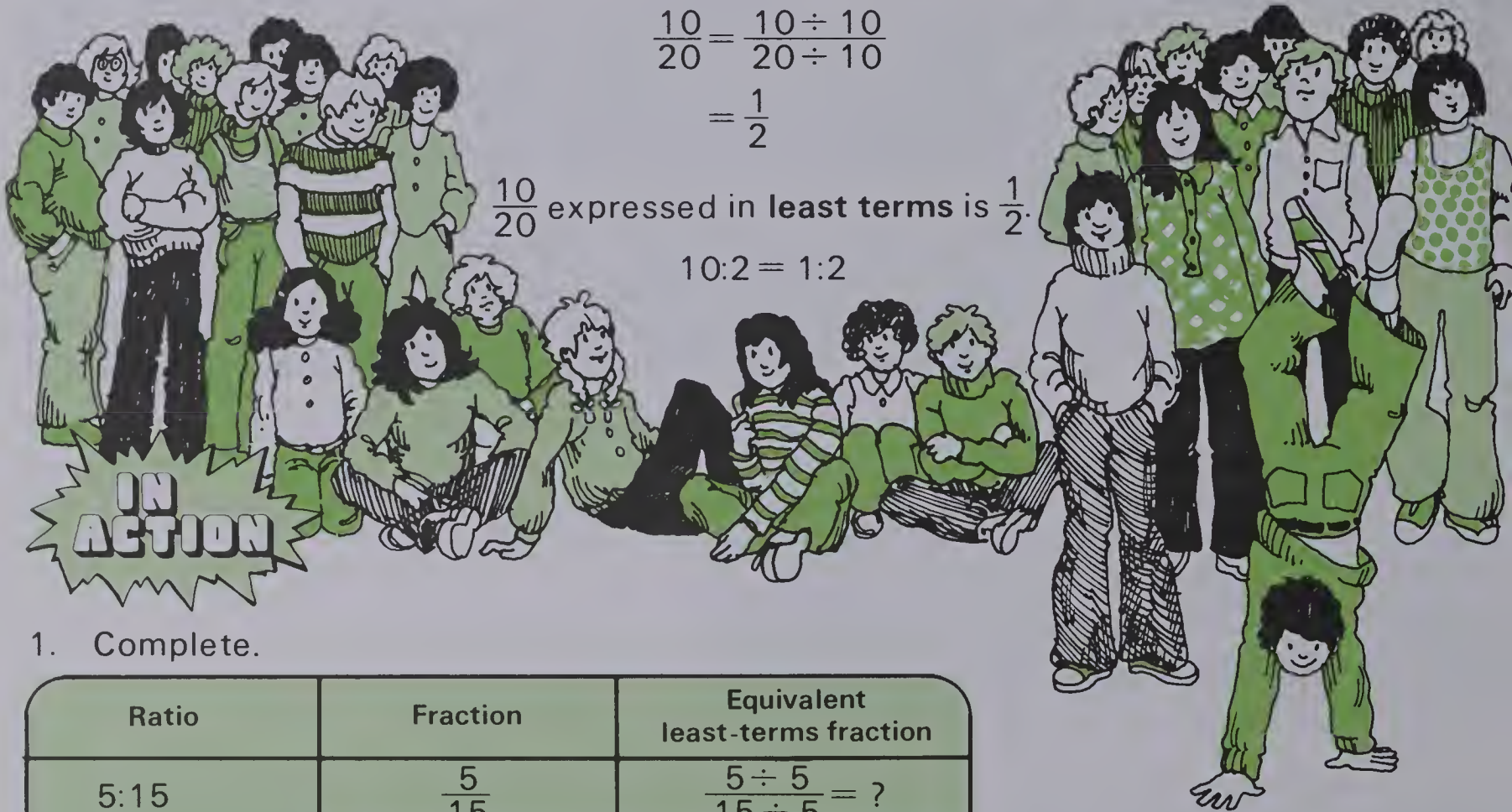
In the Grade 6 class, there are 30 students.
10 are boys and 20 are girls.

The ratio of boys to girls is 10:20 or $\frac{10}{20}$.

$$\begin{aligned}\frac{10}{20} &= \frac{10 \div 10}{20 \div 10} \\ &= \frac{1}{2}\end{aligned}$$

$\frac{10}{20}$ expressed in least terms is $\frac{1}{2}$.

$$10:2 = 1:2$$



1. Complete.

Ratio	Fraction	Equivalent least-terms fraction
5:15	$\frac{5}{15}$	$\frac{5 \div 5}{15 \div 5} = ?$
20:30		
7:28		
12:20		

2. Write equivalent least-terms fractions.

- a) 9:18 b) 10:40 c) 100:500 d) 12:30 e) 20:100
- f) 25:100 g) 20:80 h) 12:16 i) 100:200 j) 16:40

3. Mrs. Williams' car used 68 ℓ of gas to travel 400 km.
What fraction would be used to best describe the car's rate of using gas?



Equivalent Ratios

For every 2 coloured tiles there are 10 white tiles.



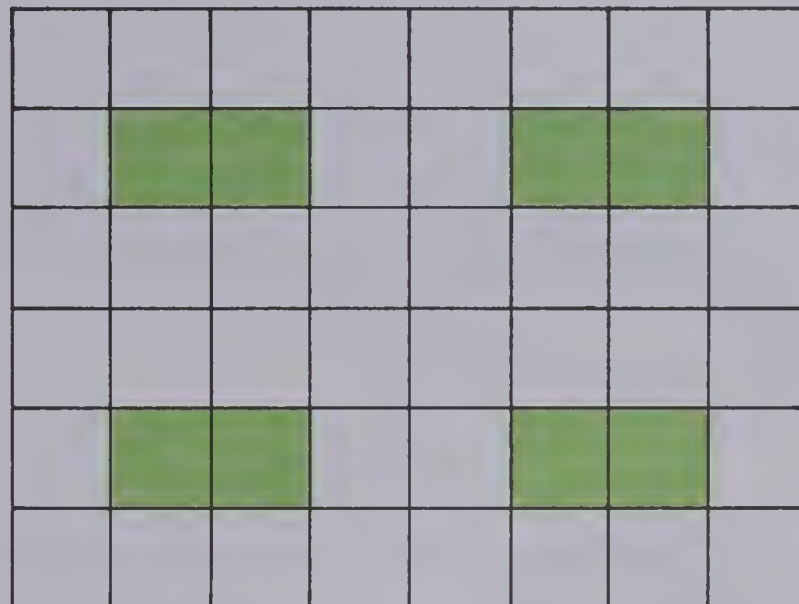
1 section

The ratio of coloured
tiles to white tiles
is 2:10
or $\frac{2}{10}$.



2 sections

The ratio of coloured
tiles to white tiles
is 4:20.
$$\frac{2}{10} = \frac{2 \times 2}{10 \times 2}$$
$$= \frac{4}{20}$$



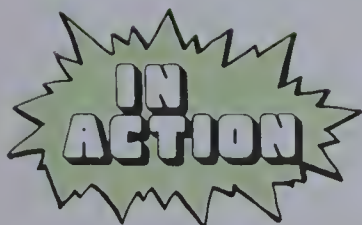
4 sections

The ratio of coloured
tiles to white tiles
is 8:40.
$$\frac{2}{10} = \frac{2 \times 4}{10 \times 4}$$
$$= \frac{8}{40}$$

$$\frac{2}{10} = \frac{4}{20} = \frac{8}{40}$$

$\frac{2}{10}$, $\frac{4}{20}$, $\frac{8}{40}$ are equivalent fractions.

2:10, 4:20, 8:40 are the corresponding **equivalent ratios**.



1. Complete.

a) $\frac{1}{2} = \frac{1 \times 2}{2 \times 2}$, $\frac{1}{2} = \frac{1 \times 5}{2 \times 5}$, $\frac{1}{2} = \frac{1 \times ?}{2 \times ?}$, $\frac{1}{2} = \frac{1 \times ?}{2 \times ?}$
 $= ?$ $= ?$ $= \frac{10}{20}$ $= ?$

b) $\frac{1}{4} = \frac{1 \times 10}{4 \times 10}$, $\frac{1}{4} = \frac{1 \times 20}{4 \times 20}$, $\frac{1}{4} = \frac{1 \times 30}{4 \times 30}$, $\frac{1}{4} = \frac{1 \times 40}{4 \times 40}$
 $= ?$ $= ?$ $= ?$ $= ?$

2. Write 3 equivalent fractions for

a) $\frac{1}{5}$ b) $\frac{1}{10}$ c) $\frac{3}{4}$
d) $\frac{2}{5}$ e) $\frac{3}{10}$ f) $\frac{4}{25}$

List the corresponding
equivalent ratios.



Equivalent Ratios

The ratio 3:5 may be written as a fraction $\frac{3}{5}$.

To write an equivalent ratio,
multiply each term
by the same factor

$$\begin{aligned} \frac{3}{5} &= \frac{3 \times 2}{5 \times 2} \\ &= \frac{6}{10} \\ 3:5 &= 6:10 \end{aligned}$$

or divide each term
by the same number.

$$\begin{aligned} \frac{15}{20} &= \frac{15 \div 5}{20 \div 5} \\ &= \frac{3}{4} \\ 15:20 &= 3:4 \end{aligned}$$



1. Complete to write equivalent ratios.

Ratio	Fraction	Equivalent fraction	Equivalent ratio
4:5	$\frac{4}{5}$	$\frac{4 \times 2}{5 \times ?} = \frac{8}{10}$	
3:4		$\frac{3 \times ?}{4 \times 5} = ?$	
7:10		$\frac{7 \times 10}{? \times 10} = ?$	
25:50		$\frac{25 \div 25}{50 \div 25} = ?$	
75:100		$\frac{75 \div ?}{100 \div ?} = \frac{3}{4}$	

2. Write 3 equivalent ratios (as fractions) for each.

- a) $\frac{1}{2}$ b) $\frac{2}{5}$ c) $\frac{1}{4}$ d) $\frac{1}{10}$ e) $\frac{3}{10}$ f) $\frac{3}{4}$

3. Write an equivalent ratio (as a fraction) for each.

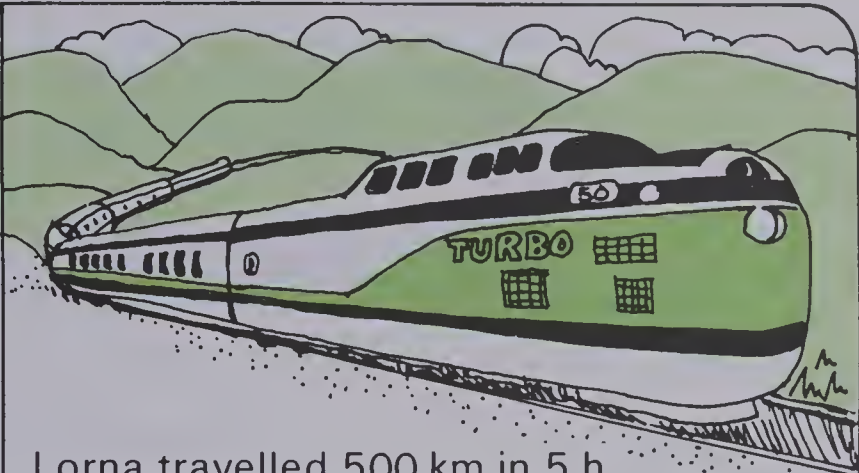
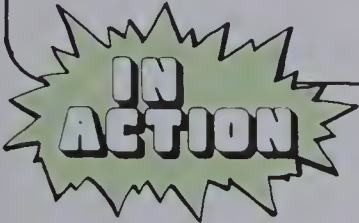
- a) $\frac{50}{100}$ b) $\frac{100}{200}$ c) $\frac{25}{50}$ d) $\frac{5}{10}$ e) $\frac{30}{40}$ f) $\frac{80}{100}$



Rates



The **rate** is
3 grapefruit for 40¢.
The corresponding ratio is
 $3:40$ or $\frac{3}{40}$.



Lorna travelled 500 km in 5 h.
The rate is 500 km / 5 h.
The corresponding ratio is 500:5 or $\frac{500}{5}$.
The least-terms fraction is $\frac{100}{1}$.
100:1 is an equivalent least-terms ratio.

Complete.

Rate	Ratio	Fraction	Least-terms fraction	Equivalent least-terms ratio
2 hits in 5 times at bat				
9 tents for 36 scouts				
125 cookies for 25 children				
76 l of gasoline used to travel 400 km				
44 shots for 4 goals				



Equivalent Rates

If a car travels 120 km in 2 h, the ratio is 120:2 or $\frac{120}{2}$.

At the same **rate**, the car would travel

60 km in 1 h

180 km in 3 h

240 km in ? h

? km in 0.5 h or $\frac{1}{2}$ h

300 km in ? h

$\frac{120}{2}$, $\frac{60}{1}$, $\frac{180}{3}$, $\frac{240}{4}$, $\frac{30}{0.5}$, $\frac{300}{4}$ are equivalent ratios.

Complete.

$$\frac{60}{1} = \frac{60 \times 2}{1 \times 2} = \frac{120}{2}$$

$$\frac{60}{1} = \frac{60 \times ?}{1 \times ?} = \frac{180}{3}$$

$$\frac{60}{1} = \frac{60 \div 2}{1 \div 2} = \frac{?}{0.5}$$

$$\frac{60}{1} = \frac{60 \times ?}{1 \times 5} = \frac{?}{?}$$

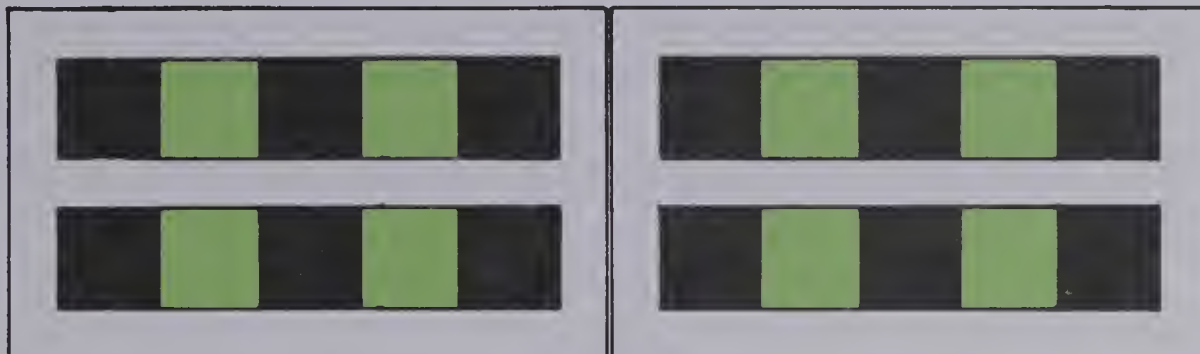


1. Complete.

Rate	Ratio	An equivalent ratio	Meaning
A cyclist rode 15 km in 1 h.	$\frac{15}{1}$	$\frac{15 \times 4}{1 \times 4} = \frac{?}{?}$	The cyclist rode 60 km in ? h.
10 oranges cost \$1.50.	$\frac{10}{150}$	$\frac{10 \div 10}{150 \div 10} = \frac{?}{?}$	
Cindy's small car used 22 l of gas to travel 200 km.		$\frac{22 \div 2}{200 \div ?} = \frac{?}{?}$	

EXPLORE

PER CENT/Comparing to 100



Consider this pattern.

In 1 rectangular unit, there are 4 coloured tiles
for every 6 black tiles.

In 2 rectangular units, there are 8 coloured tiles
for every 12 black tiles.

Make similar statements for 3, 4, and 5 rectangular units.

In 10 units there are 100 tiles.
40 tiles are coloured.
How many tiles are black?

40 out of 100 or $\frac{40}{100}$ or 40% (40 per cent) are coloured tiles.

What per cent are black tiles?

A comparison to 100 is called a **per cent**.
The symbol % means "per cent".

On a test you scored 80 marks out of 100.

$$80:100 = \frac{80}{100} = 80\%$$

You scored 80% on the test.

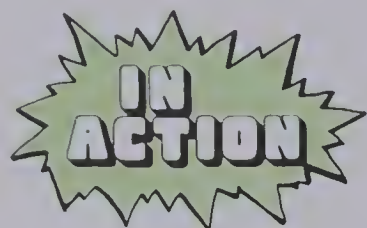


Per Cent

Comparing to 100 is a very common way of making a comparison.
30 to 100 or 30:100 is a ratio with the second term 100.

$\frac{30}{100}$ is the corresponding fraction with the denominator 100.

We write 30%. (% means "per cent".)



What is the per cent?

1. a) 60:100 b) 12:100 c) 2:100 d) 1:100 e) 0.5:100
f) $\frac{35}{100}$ g) $\frac{24}{100}$ h) $\frac{19}{100}$ i) $\frac{3}{100}$ j) $\frac{1}{100}$
k) $\frac{95}{100}$ l) $\frac{99}{100}$ m) $\frac{100}{100}$
2. A per cent can be greater than 100.
a) $\frac{90}{100}$ b) $\frac{100}{100}$ c) $\frac{200}{100}$ d) $\frac{105}{100}$ e) $\frac{120}{100}$ f) $\frac{175}{100}$ g) $\frac{250}{100}$ h) $\frac{300}{100}$
3. A per cent can be less than 1.
a) $\frac{2}{100}$ b) $\frac{1}{100}$ c) $\frac{0.5}{100}$ d) $\frac{0.75}{100}$ e) $\frac{0.25}{100}$ f) $\frac{0.2}{100}$ g) $\frac{0.8}{100}$ h) $\frac{0.1}{100}$
4. Per cents that have a whole number and a decimal are common.
a) $\frac{8.5}{100}$ b) $\frac{9.25}{100}$ c) $\frac{37.5}{100}$ d) $\frac{10.5}{100}$ e) $\frac{12.75}{100}$ f) $\frac{25.25}{100}$ g) $\frac{15.4}{100}$ h) $\frac{20.1}{100}$
5. Write the fraction.
a) 65% b) 10% c) 12% d) 100% e) 125% f) 200% g) 300%
h) 9.5% i) 8.25% j) 12.5% k) 30.5% l) 37.5% m) 15.25% n) 24.1%



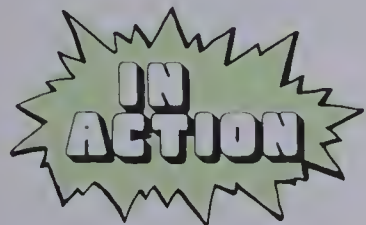
Per Cent

A comparison can be changed to an equivalent one with the second term 100. The comparison can then be given as a per cent.

The Leafs won 6 of their last 10 games.
What per cent of the games did they win?

$$\begin{aligned}\frac{6}{10} &= \frac{6 \times 10}{10 \times 10} \\ &= \frac{60}{100} \text{ or } 60\%\end{aligned}$$

The Leafs won 60% of their last 10 games.



1. Complete to find the per cents.

a) $\frac{4}{20} = \frac{4 \times 5}{20 \times 5}$
= ?
= ?%

b) $\frac{15}{25} = \frac{15 \times ?}{25 \times 4}$
= ?
= ?%

c) $\frac{7}{10} = \frac{7 \times ?}{10 \times ?}$
= ?
= ?%

d) $\frac{4}{5} = ?$
= ?
= ?%

e) $\frac{3}{2} = \frac{3 \times ?}{2 \times 50}$
= ?
= ?%

f) $\frac{3}{4} = ?$
= ?
= ?%

4. What per cent is

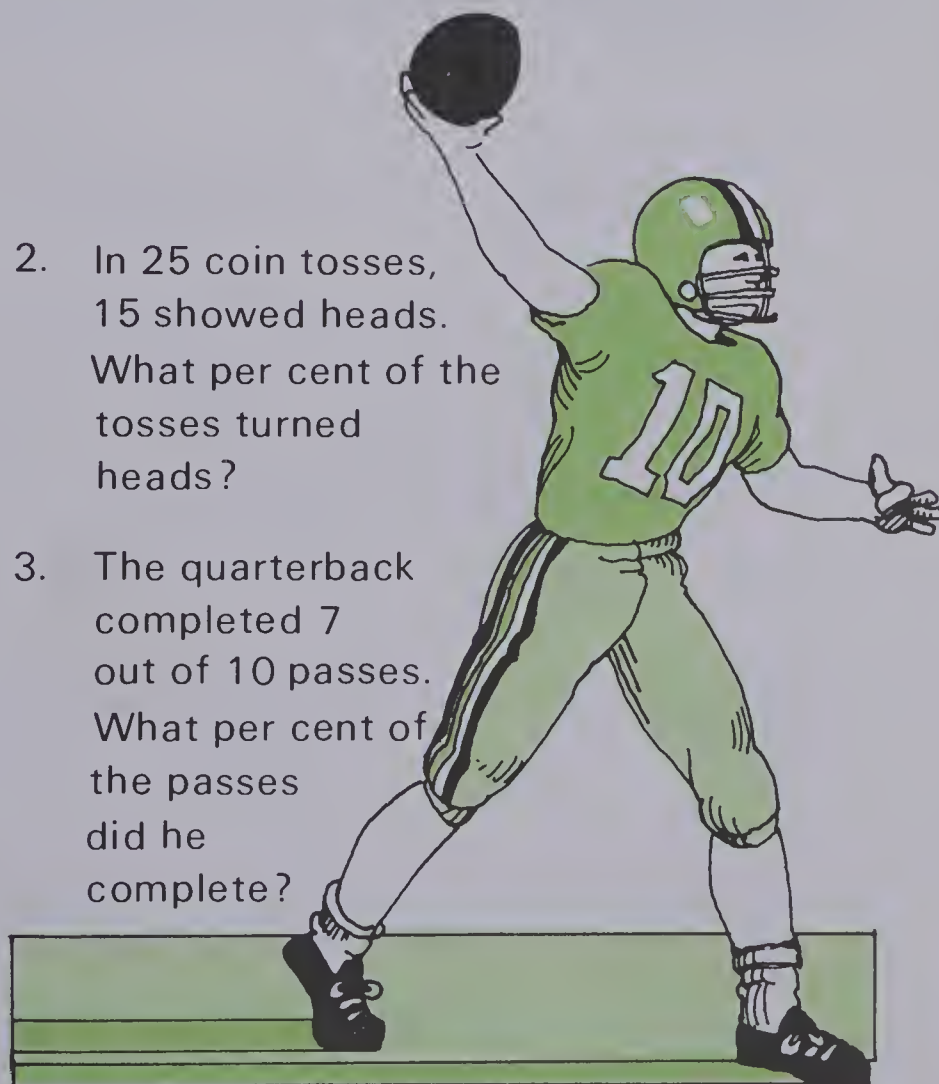
a) 4 of 5

b) 3 of 10

c) 30 of 50

d) 6 of 20

e) 20 of 25?



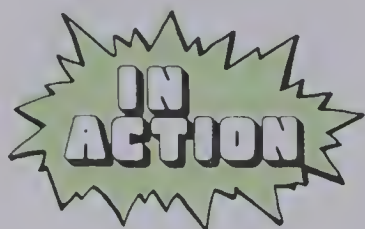


Expressing a Fraction or a Ratio as a Per Cent

If the second term of a ratio is
2, 4, 5, 10, 20, 25, or 50, you can write an equivalent ratio
with the second term 100 by multiplying
each term by the same factor.

$$\begin{aligned}\frac{7}{20} &= \frac{7 \times 5}{20 \times 5} \\ &= \frac{35}{100} \text{ or } 35\%\end{aligned}$$

7 is 35% of 20.



1. Complete.

$$\begin{aligned}\text{a) } \frac{3}{4} &= \frac{3 \times 25}{4 \times 25} \\ &= \frac{?}{100} \\ &= ?\%\end{aligned}$$

$$\begin{aligned}\text{b) } \frac{1}{5} &= \frac{1 \times ?}{5 \times ?} \\ &= ? \\ &= ?\%\end{aligned}$$

$$\begin{aligned}\text{c) } \frac{25}{50} &= \frac{25 \times ?}{50 \times ?} \\ &= ? \\ &= ?\%\end{aligned}$$

$$\begin{aligned}\text{d) } \frac{5}{2} &= \frac{5 \times 50}{2 \times 50} \\ &= ? \\ &= ?\%\end{aligned}$$

2. Express each fraction as a per cent.

$$\text{a) } \frac{1}{4}$$

$$\text{b) } \frac{3}{2}$$

$$\text{c) } \frac{2}{5}$$

$$\text{d) } \frac{7}{10}$$

$$\text{e) } \frac{9}{20}$$

$$\text{f) } \frac{3}{25}$$

$$\text{g) } \frac{5}{50}$$

3. For each ratio, write the fraction with denominator 100 and the per cent.

$$\text{a) } 1:2$$

$$\text{b) } 3:5$$

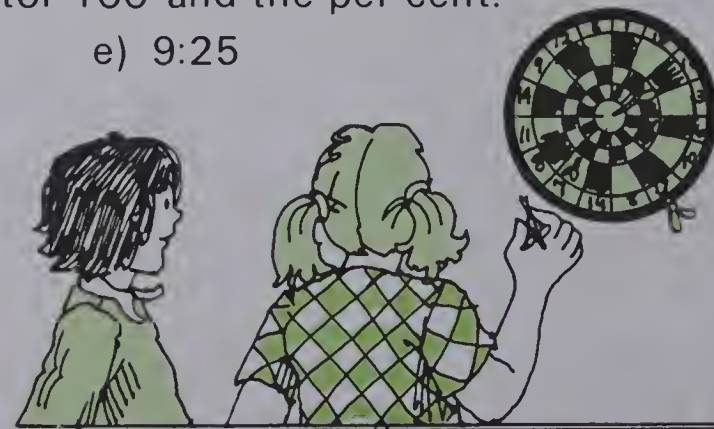
$$\text{c) } 6:10$$

$$\text{d) } 7:20$$

$$\text{e) } 9:25$$

4. Sylvia won 2 points out of 5 in the first game.
What per cent of the points did she win?

5. Mario hit the target with 15 out of 20 throws.
What per cent of the throws were hits?



Expressing a Decimal as a Per Cent

$$\begin{aligned} 0.8 \text{ means } \frac{8}{10} \\ &= \frac{8 \times 10}{10 \times 10} \\ &= \frac{80}{100} \text{ or } 80\% \end{aligned}$$

$$\begin{aligned} 0.8 &= 0.80 \\ &= 80\% \end{aligned}$$

$$\begin{aligned} 0.75 \text{ means } \frac{75}{100} \\ &= 75\% \end{aligned}$$

We can think this way:

$$0.75 = 75\%$$

$$\begin{aligned} 4.3 &= \frac{4.3 \times 100}{1 \times 100} \\ &= \frac{430}{100} \\ &= 430\% \end{aligned}$$

$$\begin{aligned} 4.3 &= 4.30 \\ &= 430\% \end{aligned}$$



1. Write as fractions to show the number of tenths or hundredths.

- a) 0.3 b) 0.25 c) 0.45 d) 0.15 e) 0.50 f) 0.75 g) 0.6
h) 0.5 i) 0.1 j) 0.05 k) 0.55 l) 0.01 m) 0.02 n) 0.99

2. Complete.

$$\begin{aligned} \text{a) } 0.9 &= 0.90 \\ &= \frac{?}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{b) } 0.38 &= \frac{?}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{c) } 2 &= \frac{2}{1} \\ &= \frac{2 \times 100}{1 \times 100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{d) } 5.4 &= \frac{5.4 \times ?}{1 \times ?} \\ &= \frac{540}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{e) } 1.5 &= \frac{150}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{f) } 9.8 &= \frac{?}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{g) } 0.1 &= \frac{?}{100} \\ &= ?\% \end{aligned}$$

$$\begin{aligned} \text{h) } 1.1 &= \frac{?}{100} \\ &= ?\% \end{aligned}$$

3. Express each decimal as a per cent.

- a) 0.4 b) 0.2 c) 0.25 d) 0.60 e) 0.45 f) 0.61 g) 0.99
h) 1.3 i) 2.5 j) 8.7 k) 5.5 l) 7.9 m) 4.75 n) 1.11
o) 4.95 p) 6.05 q) 3.1 r) 4.25 s) 8.01 t) 7.11 u) 9.99



Finding a Per Cent of a Number

Find.

8% of 50

8% means $\frac{8}{100}$ or 0.08

$$\begin{aligned} 8\% \text{ of } 50 &= 0.08 \times 50 \\ &= 4 \end{aligned}$$

$$\begin{array}{r} 50 \\ 0.08 \\ \hline 4.00 \end{array}$$

10% of 70

10% means $\frac{10}{100}$ or 0.1

$$\begin{aligned} 10\% \text{ of } 70 &= 0.10 \times 70 \\ &= 7 \end{aligned}$$

25% of 75

25% means $\frac{25}{100}$ or 0.25

$$\begin{aligned} 25\% \text{ of } 75 &= 0.25 \times 75 \\ &= 18.75 \end{aligned}$$

$$\begin{array}{r} 75 \\ 0.25 \\ \hline 375 \\ 150 \\ \hline 18.75 \end{array}$$



1. Complete to find

a) 7% of 68

7% means $\frac{7}{100}$

or 0.07

$$\begin{aligned} 7\% \text{ of } 68 &= 0.07 \times 68 \\ &= ? \end{aligned}$$

d) 1% of 19

$$\begin{aligned} 1\% \text{ of } 19 &= 0.01 \times 19 \\ &= ? \end{aligned}$$

b) 20% of 125

20% means $\frac{20}{100}$

or 0.2

$$\begin{aligned} 20\% \text{ of } 125 &= 0.2 \times 125 \\ &= ? \end{aligned}$$

e) 11% of 28

$$\begin{aligned} 11\% \text{ of } 28 &= 0.11 \times 28 \\ &= ? \end{aligned}$$

c) 35% of 250

35% means $\frac{35}{100}$

or 0.35

$$\begin{aligned} 35\% \text{ of } 250 &= 0.35 \times 250 \\ &= ? \end{aligned}$$

f) 90% of 12

$$\begin{aligned} 90\% \text{ of } 12 &= ? \times 12 \\ &= ? \end{aligned}$$

2. Find.

a) 9% of 15

e) 3% of 90

b) 6% of 108

f) 25% of 425

c) 15% of 85

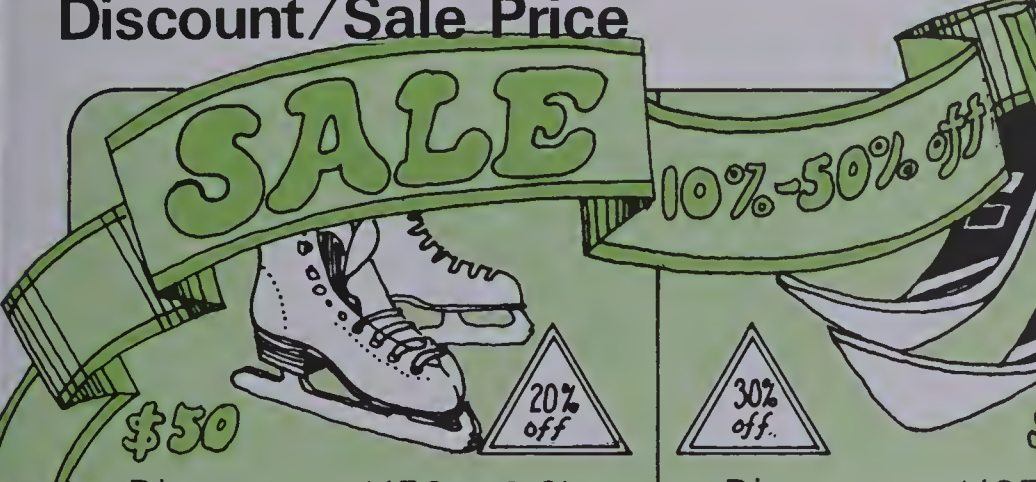
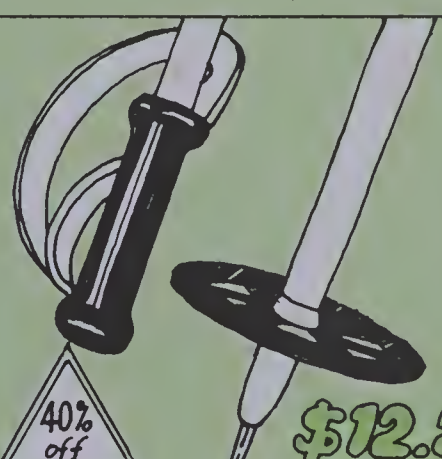
g) 60% of 100

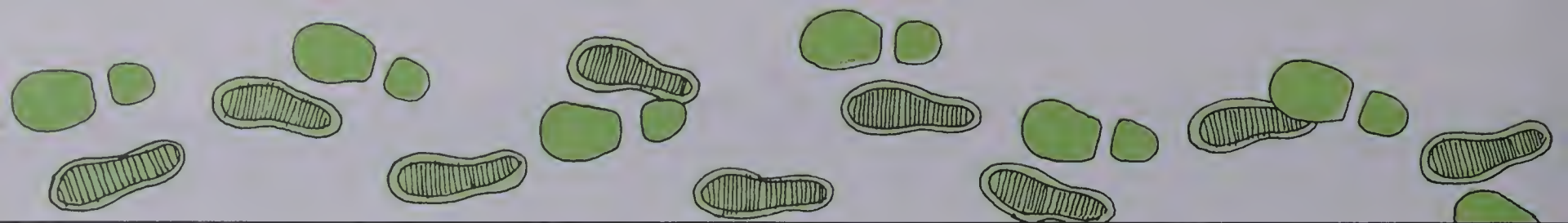
d) 18% of 150

h) 80% of 200

Discount/Sale Price

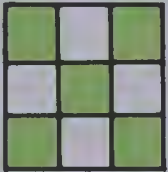
Check the bargains.

		
 \$50 20% off Discount = $\$(50 \times 0.2)$ = \$10 Sale Price = $\$(50 - 10)$ = ?	 \$85 30% off Discount = $\$(85 \times 0.3)$ = ? Sale Price = $\$(85 - ?)$ = ?	 \$40 15% off Discount = $\$(40 \times 0.15)$ = ? Sale Price = $\$(40 - ?)$ = ?
 \$35 50% off Discount = $\$(35 \times ?)$ = ? Sale Price = ?	 \$6 25% off Discount = $\$(6 \times ?)$ = ? Sale Price = ?	 \$12.50 40% off Discount = $\$(12.50 \times 0.4)$ = ? Sale Price = ?
 \$6.75 18% off Discount = ? Sale Price = ?	 \$75 35% off Discount = ? Sale Price = ?	 \$4.50 10% off Discount = ? Sale Price = ?

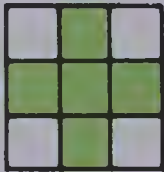


Retrace Your Steps

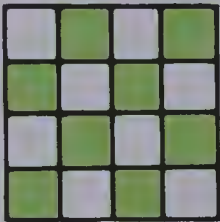
1. What is the ratio of coloured squares to white squares?

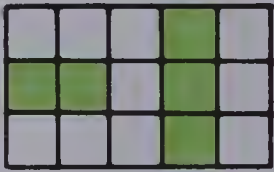
a) 

b) 

c) 

d) 

e) 

f) 

2. Use the patterns in Question 1. c) Express each ratio in fraction form.

- a) Repeat each pattern once.
b) Write the new ratio.

3. Complete.

Ratio	Fraction	Equivalent least-terms fraction
4:12		
10:30		
2:10		
4:6		

4. Calculate the sale price.

a) Bicycle
Regular Price \$100
Discount 20%
Sale Price ?

b) Skate Board
Regular Price \$15.00
Discount 5%
Sale Price ?

c) Shoes
Regular Price \$18.50
Discount 10%
Sale Price ?

5. Find the amount of tax to be paid on each item and the total cost.

Sales Tax 7%

Item	Cost	Sales tax at 7%	Total cost
a) sweater	\$12.00	\$0.84	
b) baseball	\$ 5.50		
c) book	\$ 4.75		
d) T-shirt	\$ 2.98		
e) catcher's mitt	\$15.89		



Fun With Numbers

Copy the addition question
on a piece of paper.
Add and record the sum.

986	
818	
969	Rotate the paper through 180°.
989	Add the numerals you see now.
696	
616	What do you find?
????	Why?

Arrange the numerals
from 1 to 9
so that their sum is 9999.
Use each numeral
only once.

Think of a number.
Add the next greater number.
Add 9.
Divide by 2.
Subtract the original number.
What is the result?

Repeat this
starting with different numbers.
Compare the final results.

Investigate: The product
of any 3 consecutive whole numbers
is evenly divisible by 6.

Example: $13 \times 14 \times 15$
is evenly divisible by 6.
Try other products.

Investigate multiplying by 9.

$4 \times 9 = 36$ Add the digits in the product: $3 + 6 = 9$

$51 \times 9 = 459$ Add the digits in the product: $4 + 5 + 9 = 18$

Since $18 > 9$, subtract 9. $18 - 9 = 9$

Try other multiples of 9.

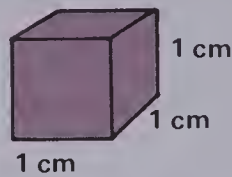
EXPLORE



VOLUME/The Cubic Centimetre cm^3

The amount of space an object occupies is called its **volume**.

This is 1 unit of volume.
It is 1 cm long, 1 cm wide, and 1 cm high.
It is called 1 cm^3
(one cubic centimetre).



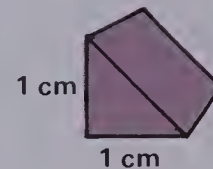
The volume of this structure is 8 cm^3 .



What is the volume of this structure?



This part cube has a volume of 0.5 cm^3 .

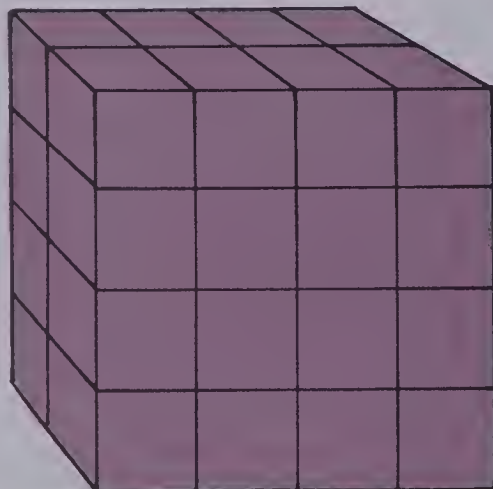


What is the volume of this structure?



Give the volume of each of these structures.

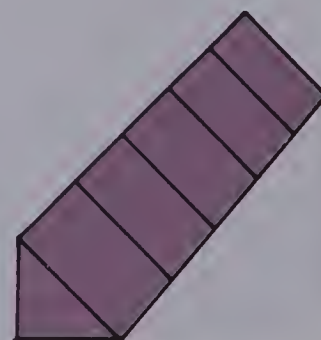
a)



b)



c)





Calculating Volume



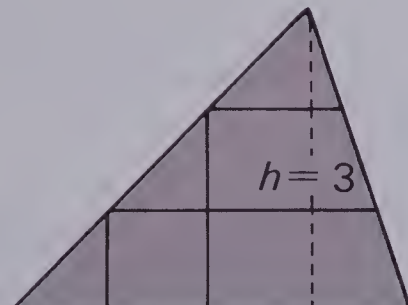
$w = 3$

$l = 4$

$$a = l \times w$$

$$a = 4 \times 3$$

$$\begin{aligned} \text{Area} &= (4 \times 3) \text{ cm}^2 \\ &= 12 \text{ cm}^2 \end{aligned}$$



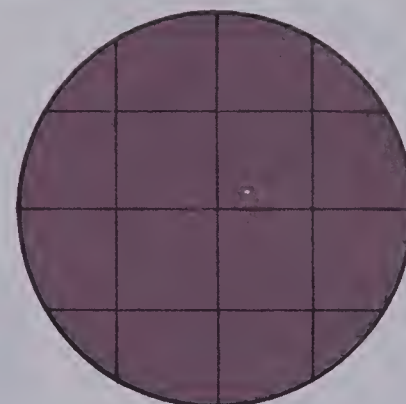
$b = 4$

$$a = \frac{b \times h}{2}$$

$$a = \frac{4 \times 3}{2}$$

$$= 6$$

$$\begin{aligned} \text{Area} &= \left(\frac{4 \times 3}{2} \right) \text{ cm}^2 \\ &= 6 \text{ cm}^2 \end{aligned}$$



By estimating,

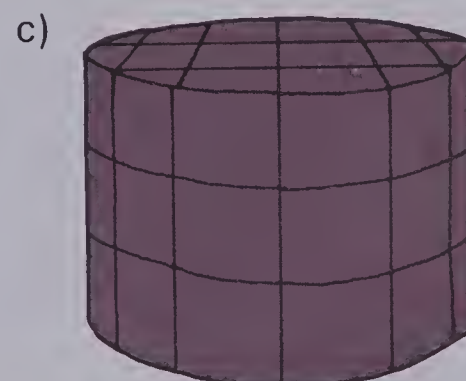
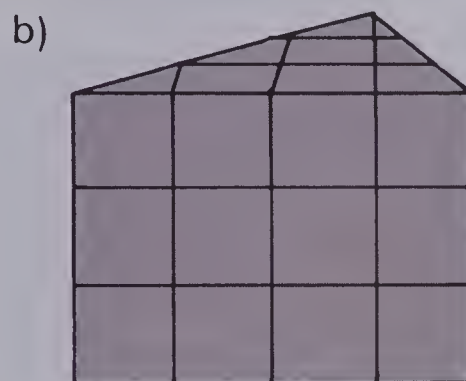
a is about 12

$$a \doteq 12$$

$$\begin{aligned} \text{Area} &= 12 \text{ cm}^2 \\ &\text{(approximately)} \end{aligned}$$

Suppose we build 3 layers on each base.

What is the volume of each structure?



a is the number of square units in the base.

h is the number of linear units in the height.

$$v = a \times h$$

$$v = 12 \times 3$$

$$= 36$$

$$\begin{aligned} \text{Volume} &= (12 \times 3) \text{ cm}^3 \\ &= 36 \text{ cm}^3 \end{aligned}$$

$$v = a \times h$$

$$v = 6 \times 3$$

$$= 18$$

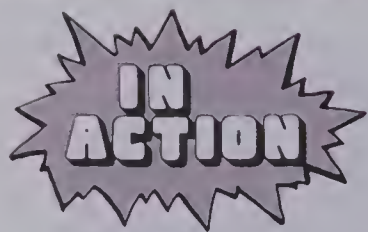
$$\begin{aligned} \text{Volume} &= (6 \times 3) \text{ cm}^3 \\ &= 18 \text{ cm}^3 \end{aligned}$$

$$v = a \times h$$

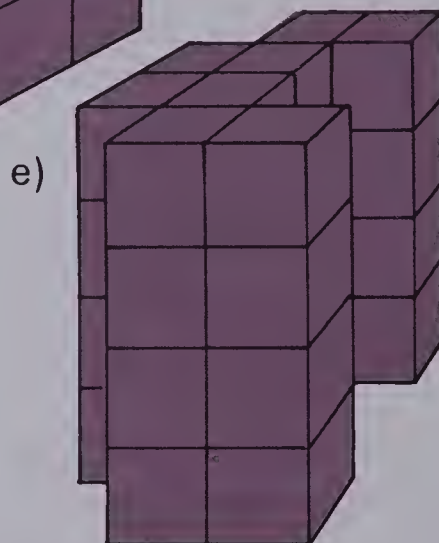
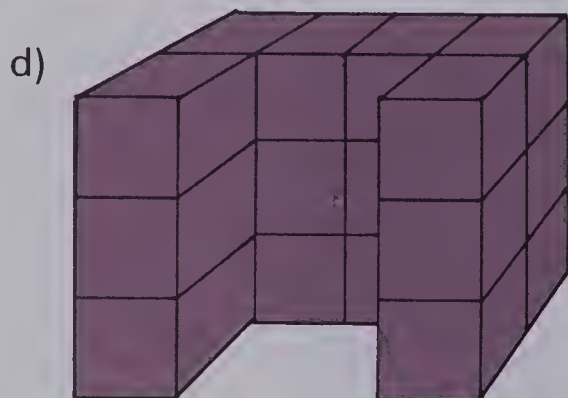
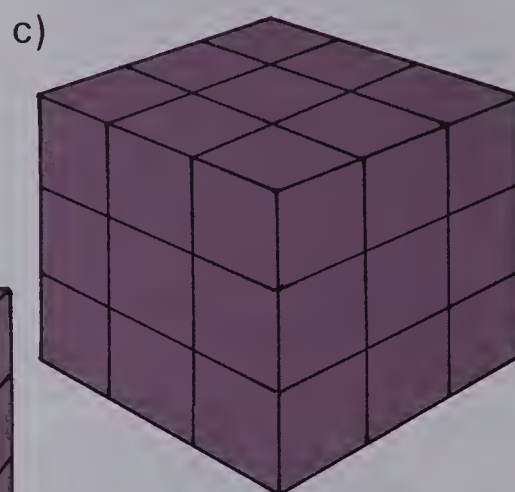
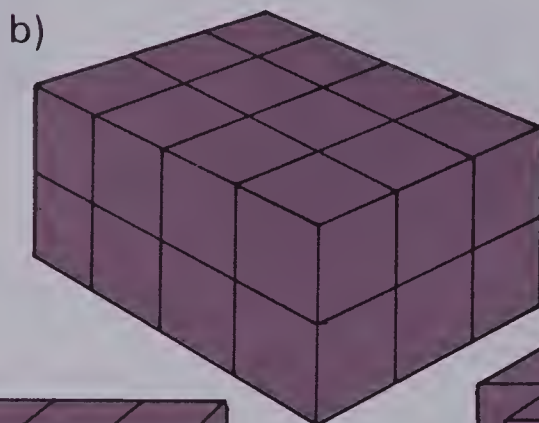
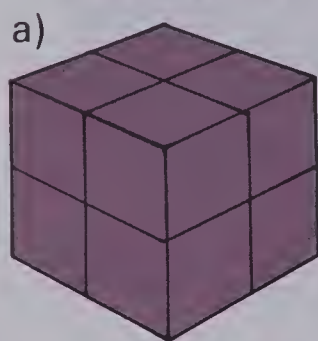
$$v \doteq 12 \times 3$$

$$\doteq 36$$

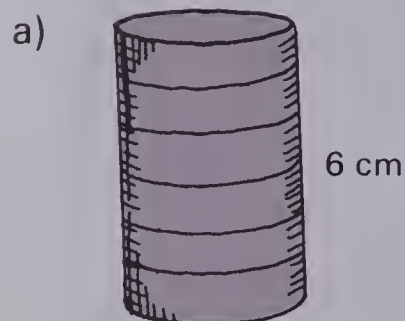
$$\begin{aligned} \text{Volume} &\doteq (12 \times 3) \text{ cm}^3 \\ &= 36 \text{ cm}^3 \\ &\text{(approximately)} \end{aligned}$$



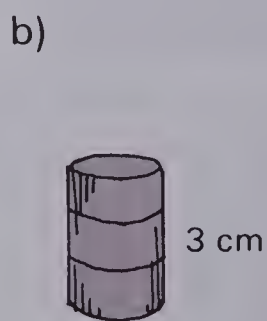
1. Calculate the volume of each solid.
Each small cube is 1 cm^3 .



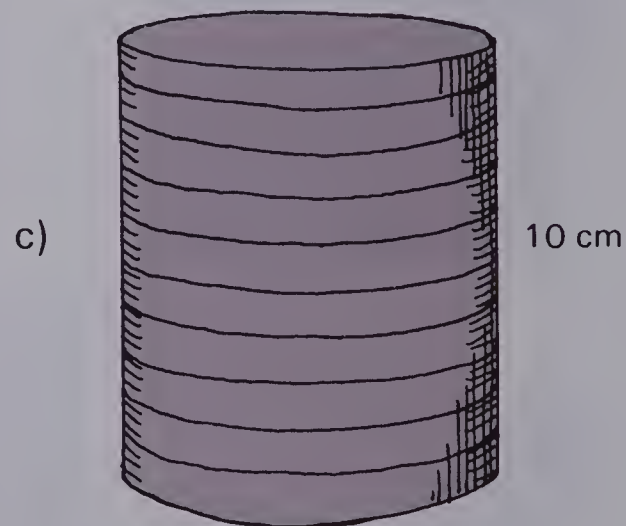
2. Calculate the approximate volume of each cylinder.
The approximate area of each base is given.



Area of base
is approximately
 12 cm^2 .



Area of base
is approximately
 3 cm^2 .

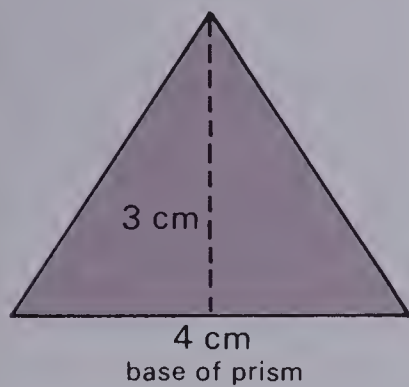


Area of base
is approximately
 50 cm^2 .

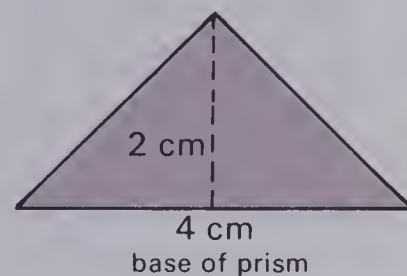
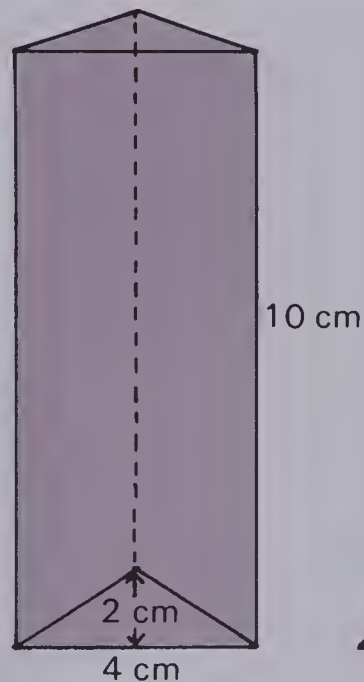
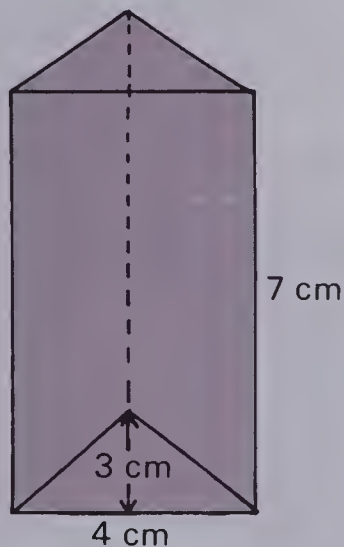


3. Calculate the volume of each triangular prism.

a)

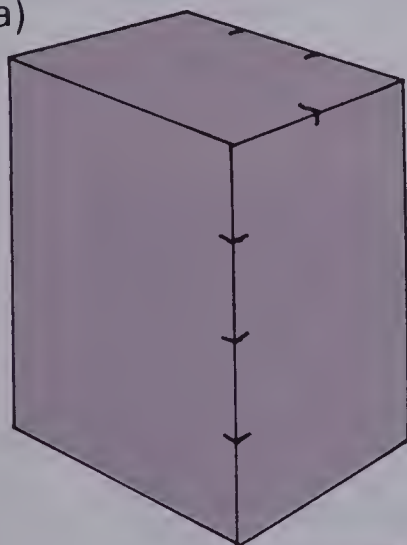


b)

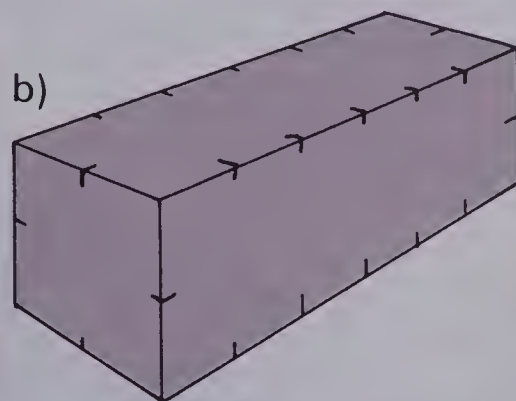


4. Find the volume of each rectangular prism.

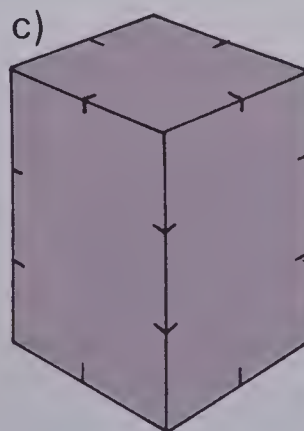
a)



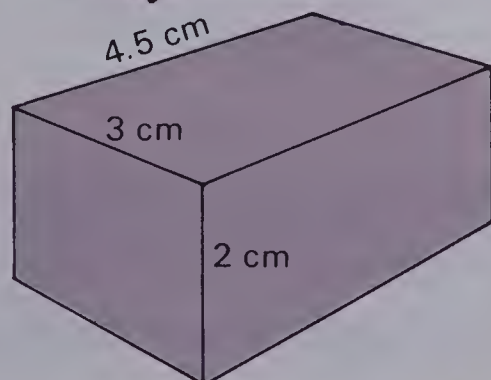
b)



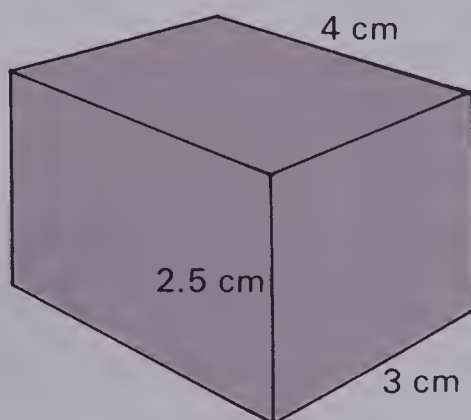
c)



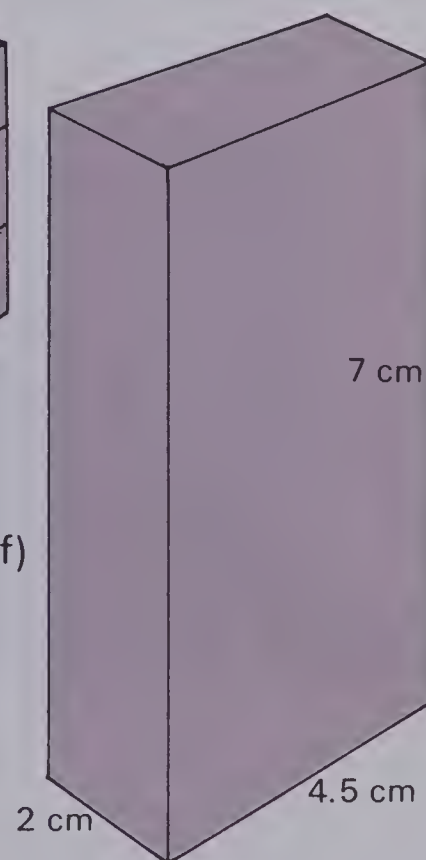
d)



e)



f)





5. Find the approximate volume of each cylinder.

a)



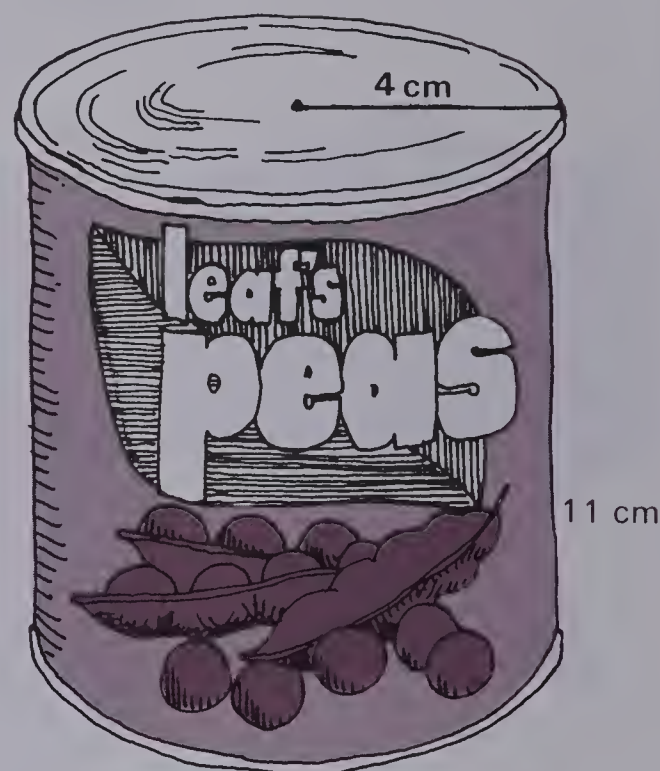
Area of base
is approximately
 19.5 cm^2 .

b)



Area of base
is approximately
 7 cm^2 .

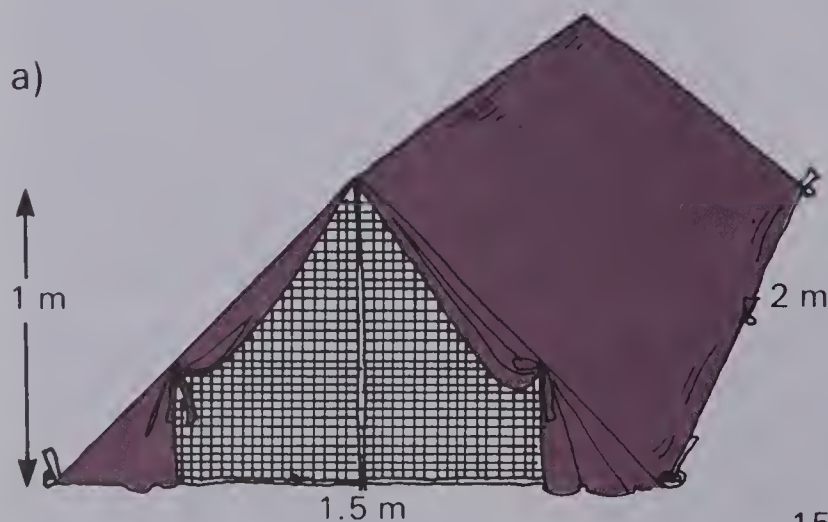
c)



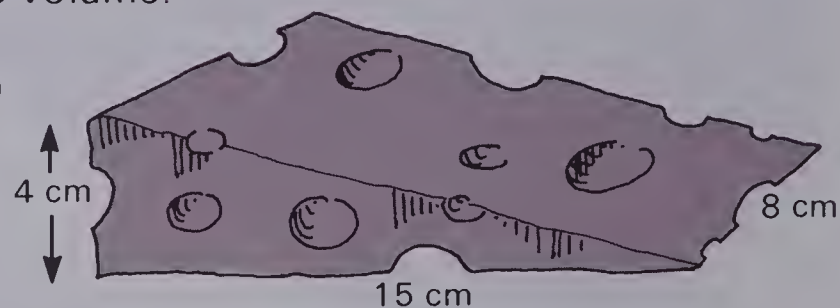
Area of base
is approximately
 50 cm^2 .

6. Find the volume.

a)



b)

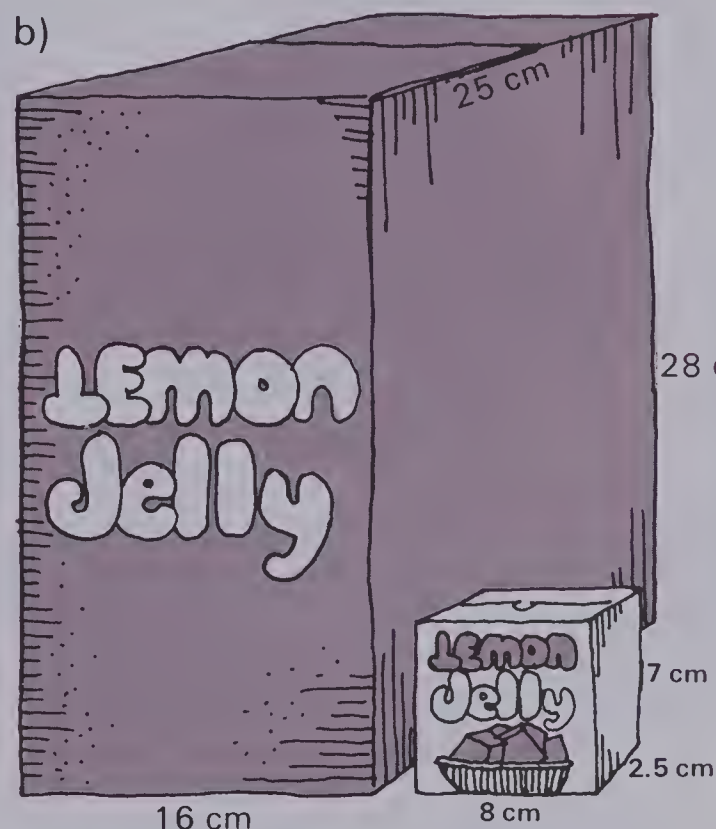


c)

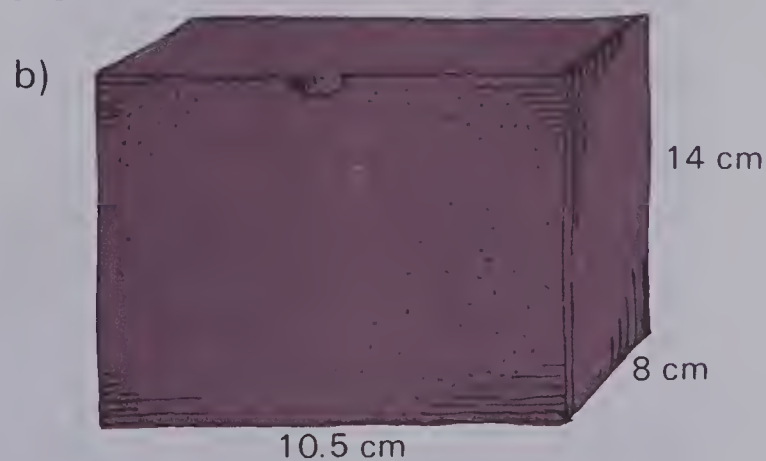
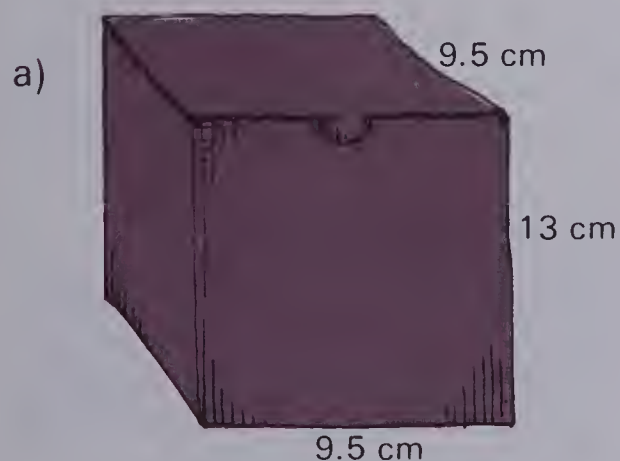




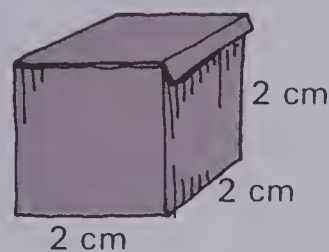
7. How many small boxes can be packed in each carton?



8. Which box has the greater volume?
How much greater?

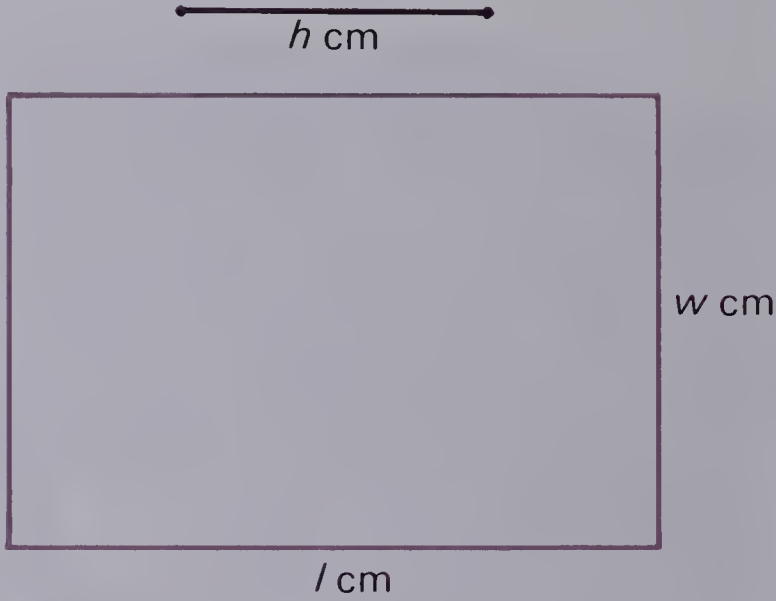


9. a) What is the volume of this box?
b) If each of the dimensions of the box were doubled, estimate the new volume.
c) Check your estimate by calculating.





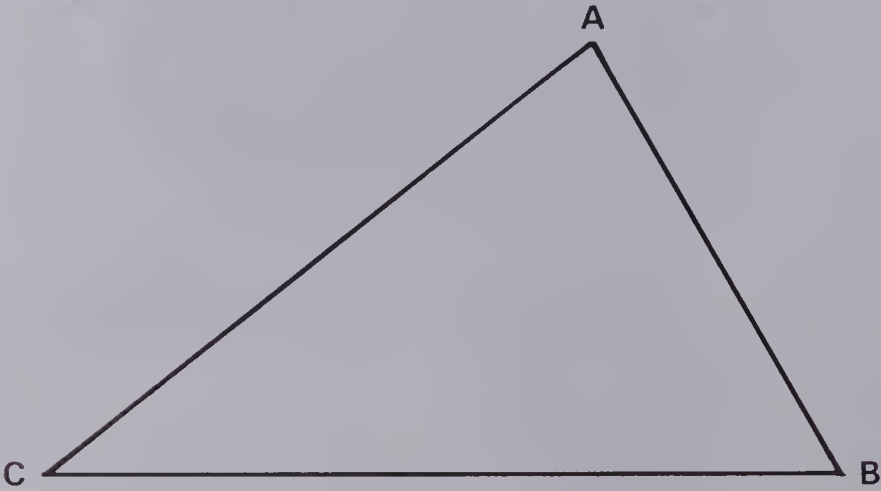
Do You Measure Accurately?



Make the measurements and calculations to complete the chart.

l	w	Area of region	h	Volume of rectangular prism with height h cm

Find an object that has the shape of a rectangular prism.
 Make a chart like the one above for your object. Have someone check your measurements and calculations.



Find the volume of a triangular prism with base $\triangle ABC$ and height h cm.
 Find an object that has the shape of a triangular prism.
 Find its volume.
 Have someone check your measurements and calculations.

The Cubic Metre m^3

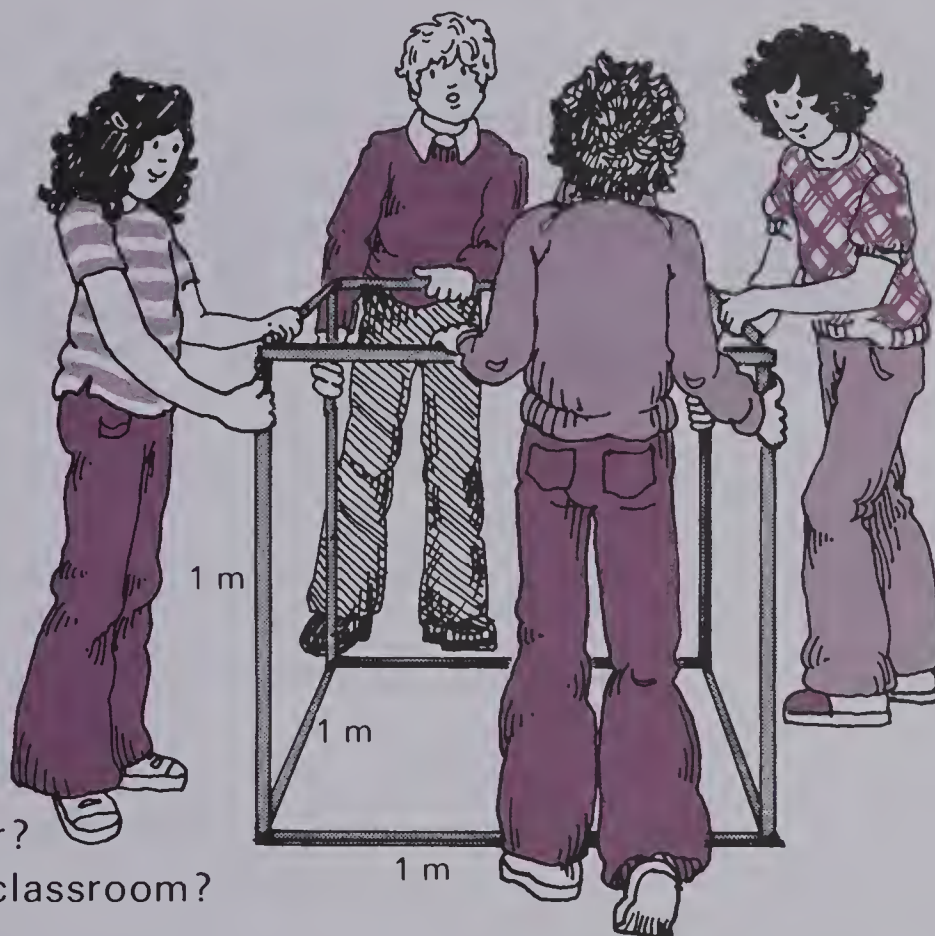
A unit of volume 1 m long, 1 m wide, and 1 m high is called 1 m^3 (one **cubic metre**). Place 4 metre-sticks on the floor so that they form a square. Now have 4 friends each hold 2 metre-sticks so that they form the vertical and horizontal edges of a cube. The volume is 1 m^3 .

Estimate the volume of your classroom in cubic metres. To the nearest metre, what is the length, width, and height of your classroom?

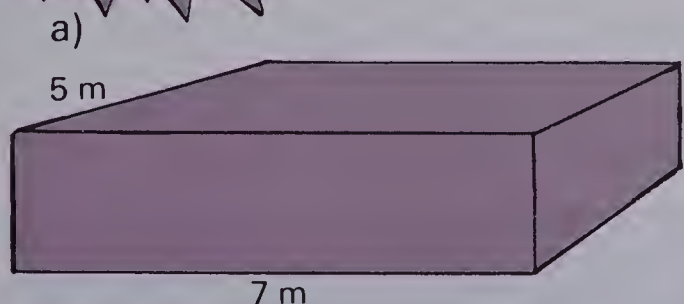
What is the approximate area of the floor?

What is the approximate volume of your classroom?

How close is your estimate?



1. Calculate the volume of each structure.



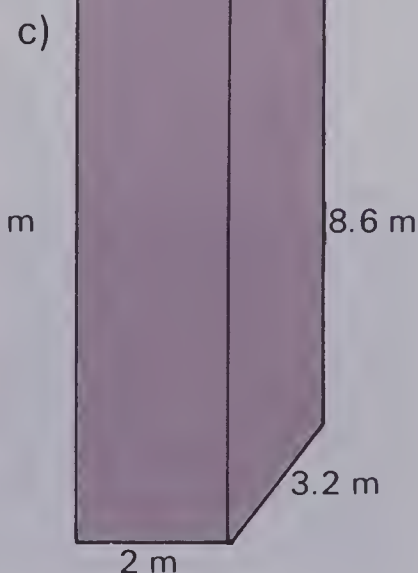
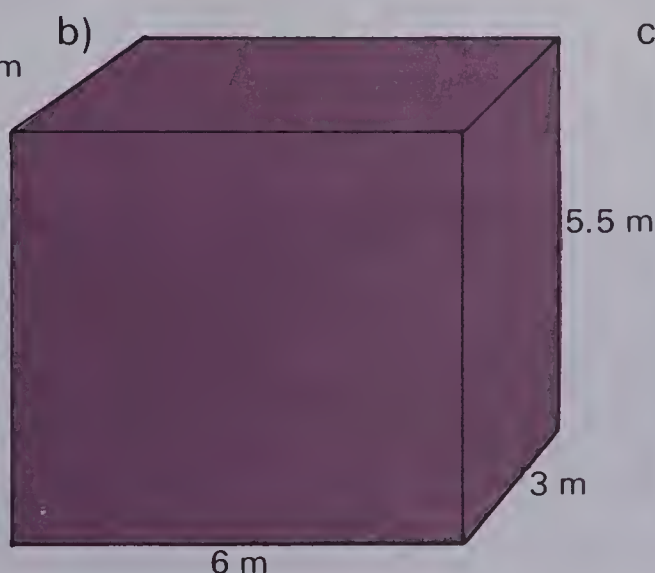
$$v = a \times h$$

$$v = 35 \times 2$$

$$= 70$$

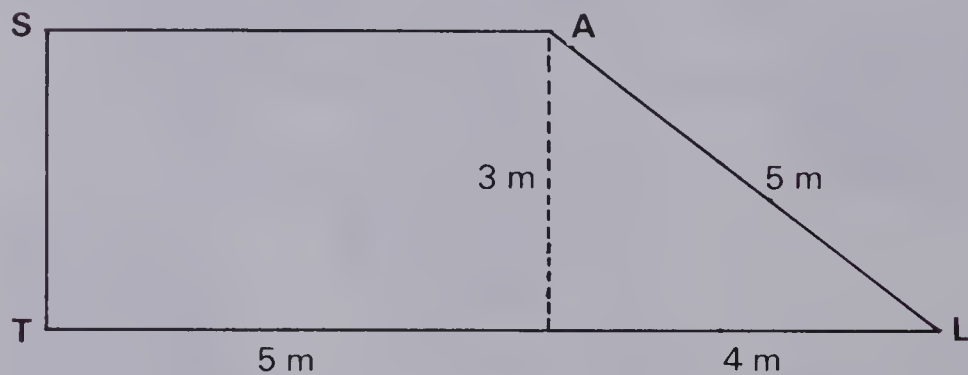
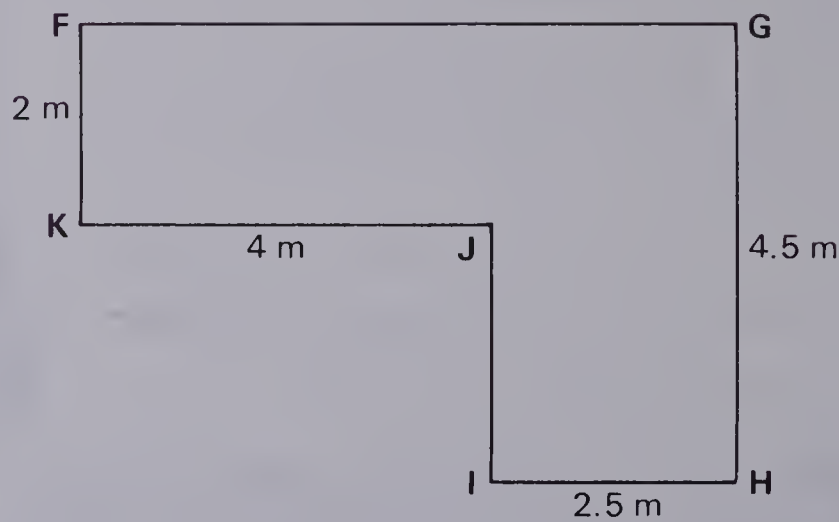
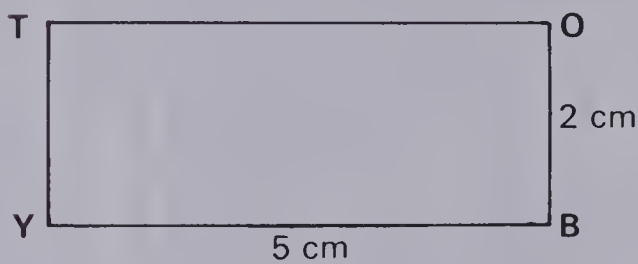
$$\text{Volume} = (35 \times 2) \text{ m}^3$$

$$= 70 \text{ m}^3$$





2. a) Find the perimeter of each shape.
 b) Find the area of each shape.
 c) Find the volumes of structures built on these bases, each with a 4-unit height.



3. Copy and complete the chart.

Length	Width	Height	Perimeter of base	Area of base	Volume
3 m	2 m	2 m			
6 m		5 m	18 m		
5 m		3 m			60 m ³
		2 m		18 m ²	
5 m	2 m				20 m ³

Numeric Dating

Numeric dating is a way of expressing a date using 8 digits.



The year is always written first.

The month is written next.

The day of the month is written next.

If 01 represents January and 05 represents May,
what digits would be used
to represent the other 10 months?

If 03 represents the third day of any month
and 11 represents the eleventh day,
what digits would be used to represent
the seventh day? the ninth day? the tenth day?

Use numeric dating to express

- | | |
|------------------------------|-------------------------------------|
| a) your birthday | b) Christmas, 1970 |
| c) St. Valentine's Day, 1972 | d) the first day of school |
| e) Confederation | f) an important event in your life. |

By adding 4 more digits you can show the time:

1977 - 05 - 22 - 15:30

This indicates an event dated in 1977, on May 22, at 15:30.

Use numeric dating to record this moment
(the time you are reading this page) in time.

EXPLORE

AVERAGE/Meaning of Average

An NHL forward had this 10-year scoring record.

Year	1	2	3	4	5	6	7	8	9	10
Number of goals	18	21	19	24	23	28	26	18	17	16

What is the total number of goals scored?

What would be the number of goals scored per year if the player had scored the same number each year?

This number would be the **average**.

$$\begin{aligned}\text{Average number of goals} &= \frac{18 + 21 + 19 + 24 + 23 + 28 + 26 + 18 + 17 + 16}{10} \\ &= \frac{210}{10} \\ &= 21\end{aligned}$$

The average attendance in a Grade 6 class for 1 week was 24 students.

List 5 different numbers for which the average is 24.

Here is one way:

$$\begin{aligned}\text{Average} &= \frac{23 + 25 + 22 + 26 + 24}{5} \\ &= 24\end{aligned}$$

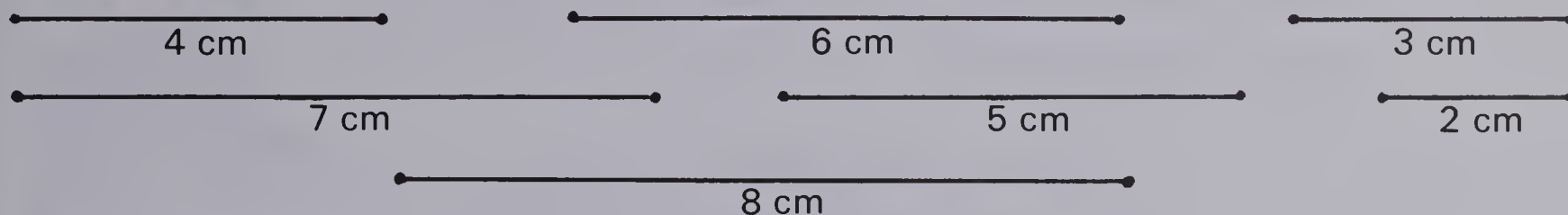
The average height of the girls is 145 cm.

List 5 heights for which the average height is 145 cm.

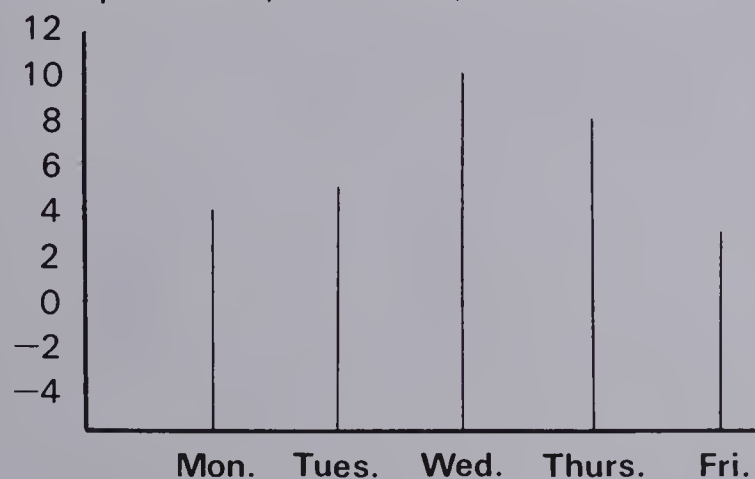




1. Find the average length of the 7 line segments.



2. Read the graph to find the daily temperature, at 10:30, for the 5 d.



What is the average temperature at 10:30 for the 5 d?

3. A motorist drove 65 km in the first hour, 70.5 km in the second hour, 50.4 km in the third hour, and 75.7 km in the fourth hour. What was the average distance travelled in 1 h?
4. 6 football players have masses of 101.6 kg, 108.5 kg, 104.4 kg, 102.8 kg, 106.6 kg, and 110.9 kg. What is the average mass of the players?





Finding an Average of a Set of Numbers

We speak of many different “averages”:

average conditions
average price
average yearly snowfall
average windspeed.

However, an **average** is a number.

To find the average of a set of numbers:

- find the sum,
- divide the sum by the number of numbers in the set.

Find the average of 6.7, 3.4, 2.6, 9.8, 12.5, 13.2, 8.1, 7.0, 11.2, 4.9

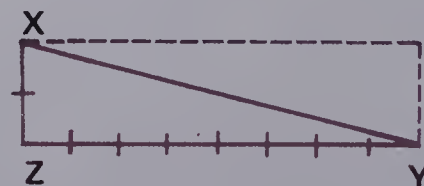
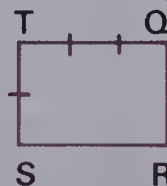
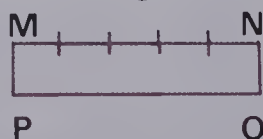
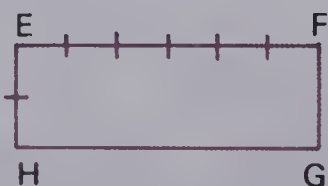
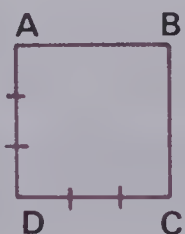
$$\begin{aligned}\text{Average} &= \frac{6.7 + 3.4 + 2.6 + 9.8 + 12.5 + 13.2 + 8.1 + 7.0 + 11.2 + 4.9}{10} \\ &= \frac{80.4}{10} \\ &= 8.04\end{aligned}$$



1. Find the average.

- a) 12, 9, 6, 5, 3, 13 b) 10, 20, 30, 40, 50, 60, 70 c) 10, 100, 1000, 10 000
d) 3.5, 2.6, 5.8, 3.7 e) 6.5, 3.8, 9.7, 7.4, 2.8 f) 12.7, 15.8, 18.6
g) 21.5, 24.6, 30.9, 35.8, 41.9, 36.7 h) 5.8, 3.9, 7.6, 4.2, 12.5, 17.1, 18.9
i) 126, 243, 568, 497, 692, 754 j) 24, 73, 86, 90, 53, 69, 46
k) 93.3, 29.6, 146.8, 257.9 l) 14.5, 27.6, 38.4, 45.2, 51.3, 62.8, 75.9

2. Which region has the average area?



EXPLORE

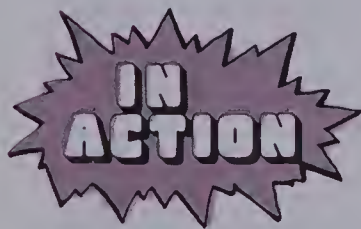
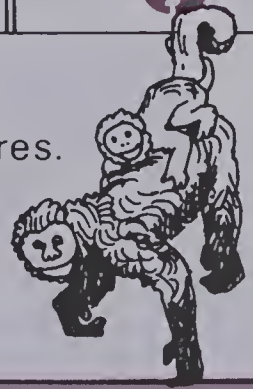
PROBLEM SOLVING/Using Diagrams

Problem A zoo-keeper decided to design a floor plan for a monkey compound using 2 squares, one smaller than the other. There would be 1 monkey in each enclosed area. Smaller monkeys would be put in the smaller areas.



Floor plan Number of monkeys 2	Floor plan Number of monkeys 2	Floor plan Number of monkeys 3	Floor plan Number of monkeys 4	Floor plan Number of monkeys 5
--	--	--	--	--

The zoo-keeper found the last plan to be the best one. It was the one that provided the greatest number of enclosures. He decided to extend his plan by using more squares.



1. Complete.

Number of squares	Diagram	Number of enclosures	Number pattern
1		1	1
2		5	1 + 4
3			
4			
5			

2. How many enclosures would you obtain with
a) 10 squares b) 15 squares?



Asking Questions

By asking yourself questions about a problem, you may be able to look at it from different points of view.

Problem List the properties of a cube.

It may help to think of an ordinary die.

How many faces does it have?

How many vertices are there?

How many edges form each face?

How many edges are there altogether?

If you traced around 1 face, what figure would you form?

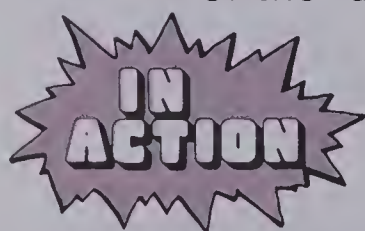
By turning the cube and tracing around the face, draw a pattern (net) that will fold into a cube.

Can you draw more than 1 net for a cube?

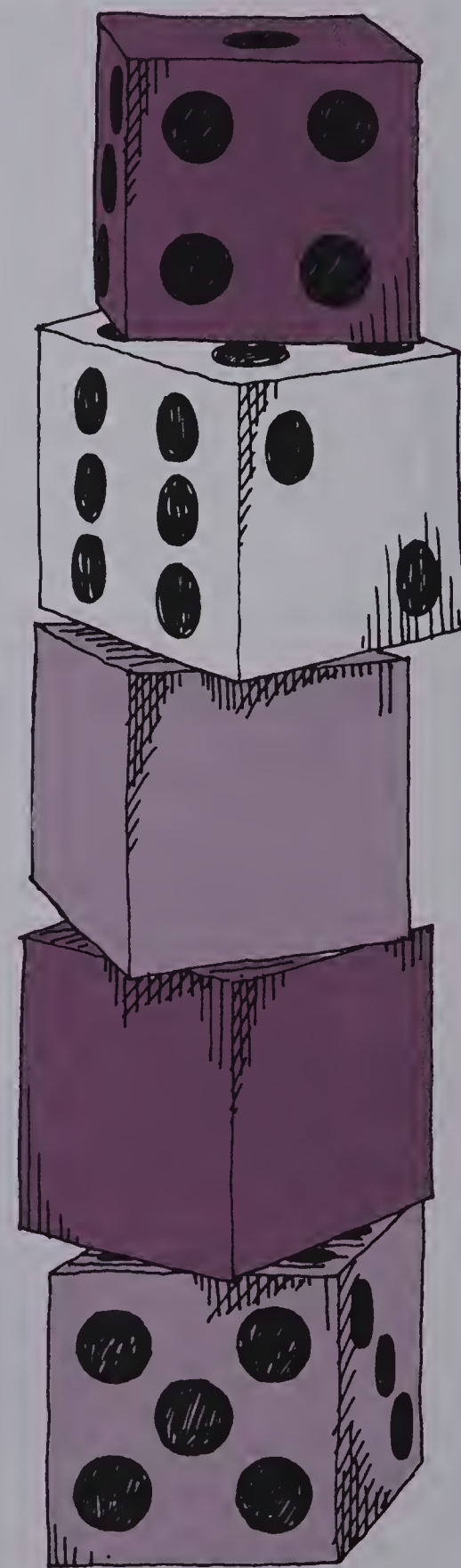
How does the cube move when you roll it?

How does the cube move when you drop it?

What happens if you place a cube on a ruler, near one end, and gradually raise that end of the ruler, leaving the other end on the table?



1. Is a cube a good model for a die? Why?
2. What other models could be used for a die if
 - a) 6 numerals are required
 - b) 5 numerals are required
 - c) 4 numerals are required?
3. A good die rolls easily.
What effect has the number of faces on this property?
4. Would a sphere make a good die? Why?
5. How would you draw
 - a) 4 regions
 - b) 6 regions on a sphere?





Collecting Data

Sometimes a problem does not provide all the information required to solve it. You have to go to other sources for the information.

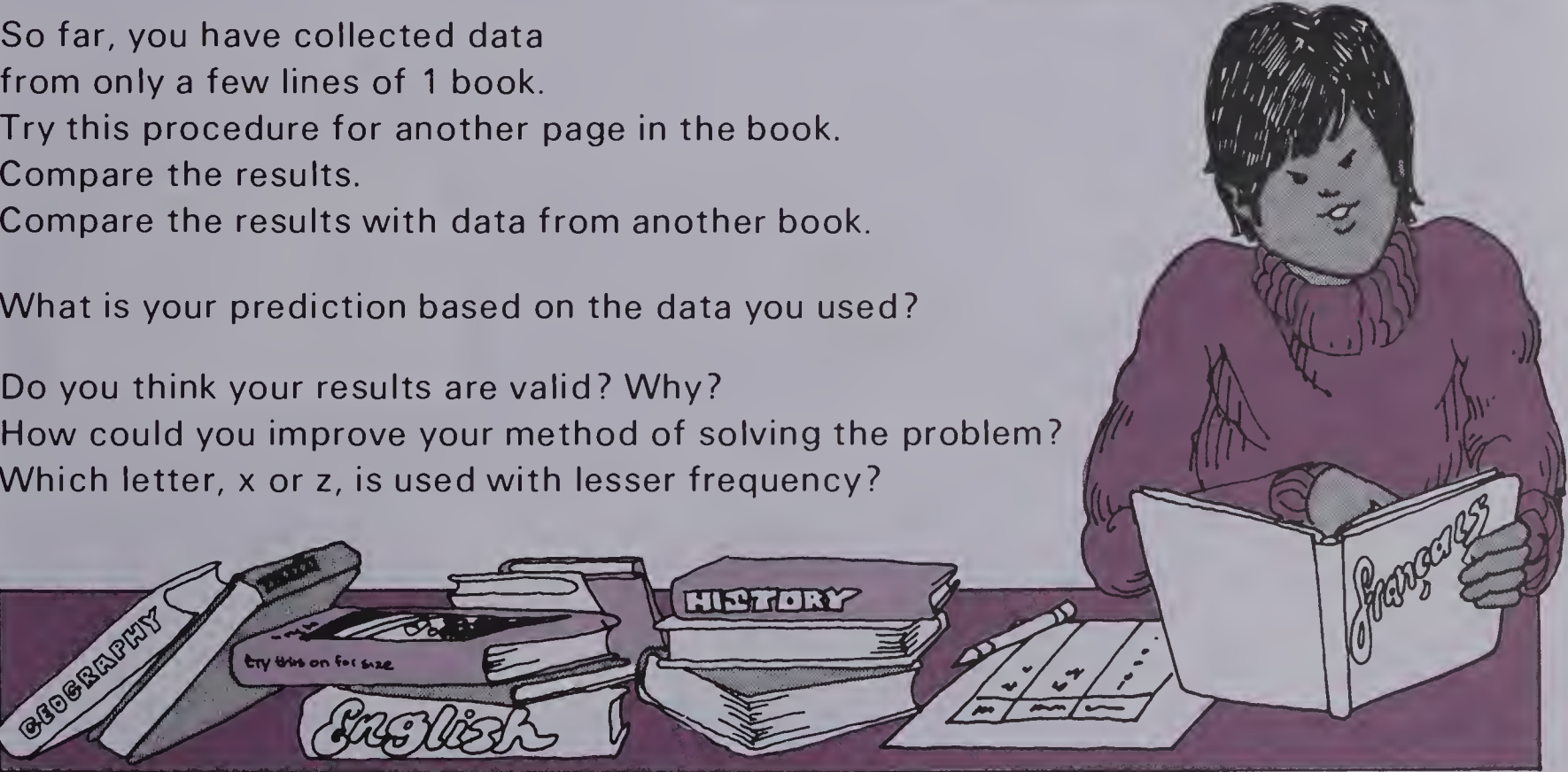
Problem Which vowel, a or e, is used with greater frequency? Estimate your answer by counting the number of a's and e's in a line of type on this page. Now use your reader for a reference. Make a tally like this.

Choose a page at random. Count the number of a's on the first line. Now count the number of e's. Continue counting for several lines—say 10. Find the total number of a's and e's.

Number of lines	Number of a's	Number of e's
1		
2		
3		
4		
Total		

So far, you have collected data from only a few lines of 1 book. Try this procedure for another page in the book. Compare the results. Compare the results with data from another book.

What is your prediction based on the data you used? Do you think your results are valid? Why? How could you improve your method of solving the problem? Which letter, x or z, is used with lesser frequency?



Word Problems

1.



How far will a car travel in 0.5 h at this rate?

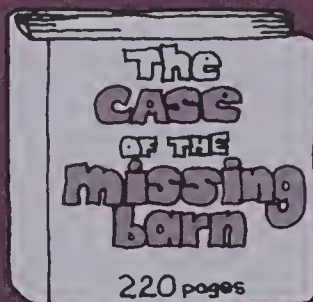
2.



How much will 5 oranges cost?

3.

Marie has read $\frac{1}{4}$ of this book.
How many pages has she read?



4.

What is the flying time for flight 31?

Flight 31	
Departure Toronto 20:54	Arrival Montreal 22:24

5.



If a driver travels 148 km in 1 d, how far can he travel in 4 d at the same rate?

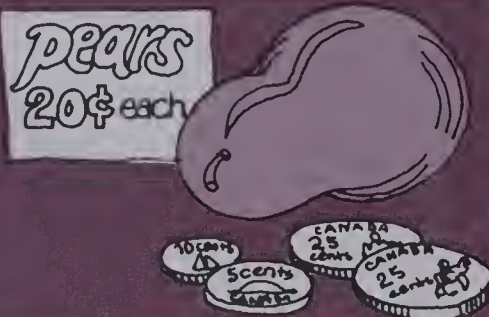
6.



How far will the girl swim, if she swims 2.5 times the length of the pool?

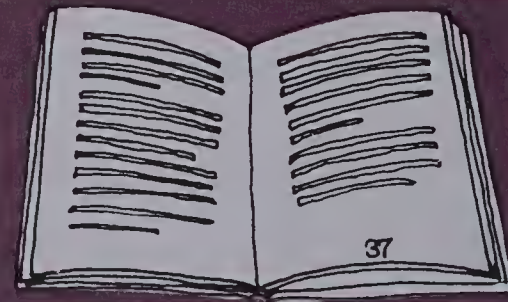
7.

How many pears could you buy with this amount of money?



8.

Andy has read $\frac{1}{4}$ of the book.
How many pages are there?

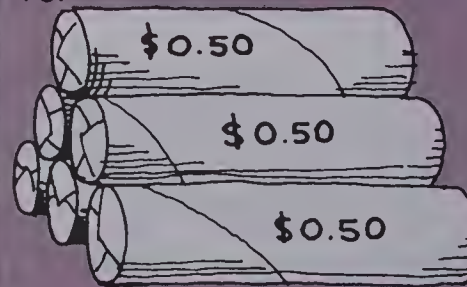


9.



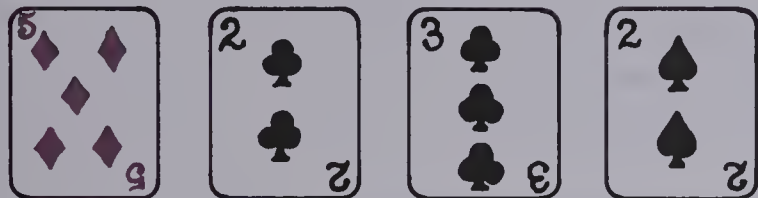
If the sales tax on \$1.00 is 7%, how much tax must be paid for this sweater?

10.



Sally rolled up all her pennies and took them to the bank. How many dollars did she receive?

Logic Problems



1. Jim said to Julie that their cards were similar in 2 ways.
3. Hans was sad. Everyone knew his card. It was?
5. Julie's and Pat's cards were similar by suit. Julie's was ?

4 children were playing cards. Find which card belonged to which player. Complete the chart.

2. Julie said to Pat that their cards were similar in 2 ways.
4. Pat said that Hans' card was worth 2 more points than her own. Hers was ?
6. Jim's card was ?

Player	Card
Jim	
Julie	
Pat	
Hans	

- 5 schools competed in a race.
To find the results:
- a) read the clues
 - b) draw and complete the chart.

Place	School	Runner	Boy/Girl
1st			
2nd			
3rd			
4th	Winoa		
5th			

- Clues**
1. 3 boys and 2 girls competed in the race.
 2. Rosewood placed 3rd.
 3. Rosewood's runner was a girl.
 4. 4th place was also a girl.
 5. Gus attends Park P.S.
 6. Gus placed ahead of Debbie.
 7. Karl placed ahead of Debbie but after Gus.
 8. Ferndale P.S. was 5th.
 9. Debbie placed ahead of Mary but after Gus.
 10. The school in 2nd place would be listed alphabetically ahead of the school in 4th place.
 11. Rhodes P.S. surprised the other schools.
 12. Ling ran for Ferndale.

If you enjoyed these problems, try making one of your own.

1. Decide on a story. Keep it simple.
2. Draw a chart with headings and fill in the answers.
3. Write statements about the answers on the chart.
4. Work out your puzzle before you give it to a friend to answer.

EXPLORE

COMPUTATION/Adding Decimals

Addition combines 2 numbers to give another number.
To develop facility in addition:

I Think efficiently.

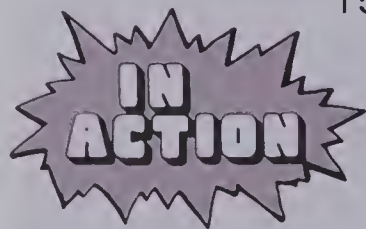
Add.
(7, 6)

Think
13

There is no need to think
"7 and 6 is 13".

II Be careful to keep the decimal points in line

4.8
3.9
6.7
15.4



Can you now

Think

16, 24
8, 11, 15

Record

4
15 ?

1. Add.

a) 28.3
9.7
0.6
12.4

b) 35.2
8.4
19.8
6.3

c) 41.6
19.2
6.9
0.7

d) 3.4
0.6
57.8
9.6

e) 15.1
63.5
83.9
93.8

2. Add.

a) 17.04
35.58
42.65
73.28

b) 43.15
67.28
75.61
49.85

c) 76.09
48.35
62.94
78.87

d) 82.15
94.63
29.48
75.36

e) 19.26
91.48
78.63
27.48

3. Add.

a) 263.14
183.69
249.36
527.68

b) 758.06
495.32
610.97
283.45

c) 123.68
647.35
862.91
928.78

d) 457.06
729.35
857.69
909.43

e) 862.50
749.36
287.98
694.87



Subtracting Decimals

Even though the concept of place value and the decimal system is one of the greatest achievements of all times, it is so simple that we use it automatically.

To develop facility in subtraction, think the regrouping.

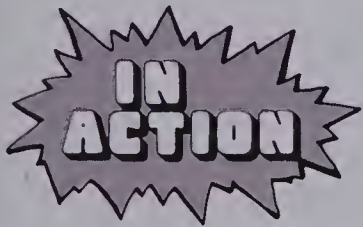
I Subtract.
(14, 9)

Think
5

There is no need to think
“14 take away 9 is 5”.

II Subtract.
$$\begin{array}{r} 35.62 \\ -14.87 \\ \hline 20.75 \end{array}$$

Think *Record*
12, 5 5
15, 7 7
4, 0 0
3, 2 2



1. Subtract.

a)
$$\begin{array}{r} 41.5 \\ -20.6 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 53.9 \\ -14.8 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 75.4 \\ -57.6 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 84.8 \\ -27.9 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 67.5 \\ -59.8 \\ \hline \end{array}$$

2. Subtract.

a)
$$\begin{array}{r} 29.43 \\ -17.56 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 35.54 \\ -12.87 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 67.25 \\ -29.38 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 53.64 \\ -16.89 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 89.76 \\ -19.87 \\ \hline \end{array}$$

3. Subtract.

a)
$$\begin{array}{r} 634.25 \\ -425.17 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 527.41 \\ -219.63 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 753.62 \\ -268.14 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 283.65 \\ -128.66 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 546.39 \\ -167.58 \\ \hline \end{array}$$

4. Subtract.

a)
$$\begin{array}{r} 436.12 \\ -148.75 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 639.72 \\ -501.85 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 834.25 \\ -358.16 \\ \hline \end{array}$$

d)
$$\begin{array}{r} 725.18 \\ -416.39 \\ \hline \end{array}$$

e)
$$\begin{array}{r} 736.54 \\ -567.89 \\ \hline \end{array}$$

Multiplying Decimals

Multiplication operates with 2 factors to give a product.

- I Multiply.
(6, 9)

Think
54

There is no need to think
"6 times 9 is 54".

II Multiply.

$$\begin{array}{r} 4.7 \\ 6.8 \\ \hline 376 \\ 282 \\ \hline 31.96 \end{array}$$

Can you

Think

56
32, 37
42
24, 28

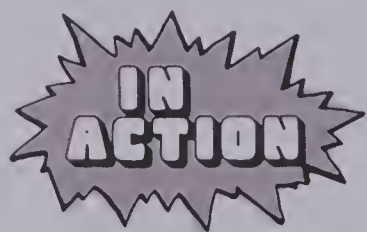
Record

6
37
2, one place left
28?

There is 1 decimal place in the factor 4.7.

There is 1 decimal place in the factor 6.8.

Therefore, there are 2 decimal places in the product 31.96.



1. Multiply.

a) $\begin{array}{r} 5.3 \\ 6.2 \\ \hline \end{array}$

b) $\begin{array}{r} 7.4 \\ 2.5 \\ \hline \end{array}$

c) $\begin{array}{r} 6.5 \\ 7.3 \\ \hline \end{array}$

d) $\begin{array}{r} 8.4 \\ 3.7 \\ \hline \end{array}$

e) $\begin{array}{r} 4.9 \\ 6.5 \\ \hline \end{array}$

2. Multiply.

a) $\begin{array}{r} 3.52 \\ 4.6 \\ \hline \end{array}$

b) $\begin{array}{r} 7.49 \\ 23 \\ \hline \end{array}$

c) $\begin{array}{r} 627 \\ 5.8 \\ \hline \end{array}$

d) $\begin{array}{r} 439 \\ 0.26 \\ \hline \end{array}$

e) $\begin{array}{r} 75.4 \\ 2.9 \\ \hline \end{array}$

3. Multiply.

a) $\begin{array}{r} 61.28 \\ 7 \\ \hline \end{array}$

b) $\begin{array}{r} 74.95 \\ 0.9 \\ \hline \end{array}$

c) $\begin{array}{r} 38.19 \\ 2.8 \\ \hline \end{array}$

d) $\begin{array}{r} 578.6 \\ 4.9 \\ \hline \end{array}$

e) $\begin{array}{r} 849.3 \\ 0.76 \\ \hline \end{array}$



Multiplying and Dividing by 10, 100, 1000

Study the patterns.

$85 \times 10 = 850$
 $8.5 \times 10 = 85$
 $0.85 \times 10 = 8.5$

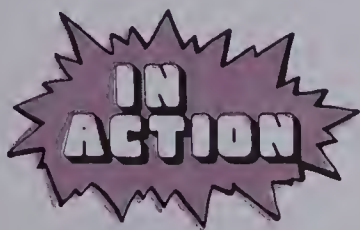
$850 \div 10 = ?$
 $85 \div 10 = ?$
 $8.5 \div 10 = ?$

$85 \times 100 = 8500$
 $8.5 \times 100 = 850$
 $0.85 \times 100 = 85$

$8500 \div 100 = ?$
 $850 \div 100 = ?$
 $85 \div 100 = ?$

$85 \times 1000 = 85\,000$
 $8.5 \times 1000 = 8500$
 $0.85 \times 1000 = 850$

$85\,000 \div 1000 = ?$
 $8500 \div 1000 = ?$
 $850 \div 1000 = ?$



1. Complete the patterns.
- a) $0.39 \times 10 = ?$
 $3.9 \times 10 = ?$
 $39 \times 10 = ?$

b) $470 \div 10 = ?$
 $47 \div 10 = ?$
 $4.7 \div 10 = ?$

c) $0.41 \times 100 = ?$
 $4.1 \times 100 = ?$
 $41 \times 100 = ?$

d) $29 \div 100 = ?$
 $290 \div 100 = ?$
 $2900 \div 100 = ?$
- e) $0.53 \times 1000 = ?$
 $5.3 \times 1000 = ?$
 $53 \times 1000 = ?$

f) $128 \div 1000 = ?$
 $1280 \div 1000 = ?$
 $12\,800 \div 1000 = ?$

g) $1.4 \times 10 = ?$
 $1.4 \times 100 = ?$
 $1.4 \times 1000 = ?$

h) $870 \div 10 = ?$
 $870 \div 100 = ?$
 $870 \div 1000 = ?$

2. Complete. Express one unit in terms of another.

Units	Operation	Example
A number of millimetres as a number of centimetres	$\div 10$	
A number of millimetres as a number of metres		$190\text{ mm} = 0.19\text{ m}$
A number of centimetres as a number of metres		
A number of metres as a number of kilometres		
A number of metres as a number of millimetres		$4.75\text{ m} = 4750\text{ mm}$
A number of kilograms as a number of grams		
A number of grams as a number of kilograms		
A number of litres as a number of millilitres	$\times 1000$	
A number of millilitres as a number of litres		

Multiplying and Dividing by 0.1

Study the patterns.

$$\begin{array}{ll}
 5.8 \times 100 = 580 & 5.8 \div 100 = 0.058 \\
 5.8 \times 10 = 58 & 5.8 \div 10 = 0.58 \\
 5.8 \times 1 = 5.8 & 5.8 \div 1 = 5.8 \\
 5.8 \times 0.1 = 0.58 & 5.8 \div 0.1 = 58
 \end{array}$$

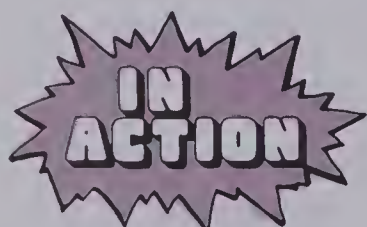
$$\begin{array}{llll}
 127 \times 0.1 = 12.7 & 12.7 \div 0.1 = 127 & 12.7 \times 0.1 = 1.27 & 1.27 \div 0.1 = 12.7 \\
 127 \div 10 = 12.7 & 12.7 \times 10 = 127 & 12.7 \div 10 = 1.27 & 1.27 \times 10 = 12.7
 \end{array}$$

From the patterns we see that:

multiplying a number by 0.1 is the same as dividing the number by 10.

You could think: $0.1 = \frac{1}{10}$, therefore $5.8 \times 0.1 = 5.8 \times \frac{1}{10}$

$$\begin{aligned}
 &= \frac{5.8 \times 1}{10} \\
 &= 5.8 \div 10
 \end{aligned}$$



Similarly, dividing a number by 0.1 is the same as multiplying the number by 10. Why?

1. Complete the patterns.

$$\begin{array}{ll}
 \text{a) } 17.9 \times 100 = ? & 17.9 \div 100 = ? \\
 17.9 \times 10 = ? & 17.9 \div 10 = ? \\
 17.9 \times 1 = ? & 17.9 \div 1 = ? \\
 17.9 \times 0.1 = ? & 17.9 \div 0.1 = ?
 \end{array}
 \qquad
 \begin{array}{ll}
 \text{b) } 0.4 \times 100 = ? & 0.4 \div 100 = ? \\
 0.4 \times 10 = ? & 0.4 \div 10 = ? \\
 0.4 \times 1 = ? & 0.4 \div 1 = ? \\
 0.4 \times 0.1 = ? & 0.4 \div 0.1 = ?
 \end{array}$$

2. Complete.

$$\begin{array}{lll}
 \text{a) } 256 \times 0.1 = ? & \text{b) } 94.7 \times 0.1 = ? & \text{c) } 0.5 \times 0.1 = ? \\
 ? \div 0.1 = 256 & ? \div 0.1 = 94.7 & ? \div 0.1 = 0.5 \\
 256 \div 10 = ? & 94.7 \div 10 = ? & 0.5 \div 10 = ? \\
 ? \times 10 = 256 & ? \times 10 = 94.7 & ? \times 10 = 0.5
 \end{array}$$

3. Find.

$$\begin{array}{lll}
 \text{a) } 29 \times 0.1, 29 \times 10, 29 \div 0.1, 29 \div 10 & & \\
 \text{b) } 10.1 \times 0.1, 10.1 \times 10, 10.1 \div 0.1, 10.1 \div 10 & & \\
 \text{c) } 287 \times 0.1, 287 \div 0.1 & \text{d) } 75.4 \times 0.1, 75.4 \div 0.1 & \text{e) } 156.2 \times 0.1, 156.2 \div 0.1
 \end{array}$$



Multiplying and Dividing by 0.01

Study the patterns.

$$\begin{array}{ll} 1750 \times 0.01 = 17.5 & 17.50 \div 0.01 = 1750 \\ 175 \times 0.01 = 1.75 & 1.75 \div 0.01 = 175 \\ 17.5 \times 0.01 = 0.175 & 0.175 \div 0.01 = 17.5 \end{array}$$

$$\begin{array}{ll} 17.50 \times 100 = 1750 & 1750 \div 100 = 17.5 \\ 1.75 \times 100 = 175 & 175 \div 100 = 1.75 \\ 0.175 \times 100 = 17.5 & 17.5 \div 100 = 0.175 \end{array}$$

How is the decimal point in a number moved when the number is
multiplied by 0.01

divided by 0.01

multiplied by 100

divided by 100?



1. Complete the patterns.

$$\begin{array}{llll} \text{a) } 0.6 \times 0.01 = ? & \text{b) } 0.6 \div 0.01 = ? & \text{c) } 0.6 \times 100 = ? & \text{d) } 0.6 \div 100 = ? \\ 6 \times 0.01 = ? & 6 \div 0.01 = ? & 6 \times 100 = ? & 6 \div 100 = ? \\ 60 \times 0.01 = ? & 60 \div 0.01 = ? & 60 \times 100 = ? & 60 \div 100 = ? \end{array}$$

2. Find.

$$\begin{array}{lll} \text{a) } 65 \times 0.01, 65 \div 0.01 & \text{b) } 9.4 \times 0.01, 9.4 \div 0.01 & \text{c) } 0.5 \times 0.01, 0.5 \div 0.01 \\ 65 \times 100, 65 \div 100 & 9.4 \times 100, 9.4 \div 100 & 0.5 \times 100, 0.5 \div 100 \end{array}$$

3. Find.

$$\text{a) } 125 \times 0.01, 125 \div 0.01 \quad \text{b) } 48.3 \times 0.01, 48.3 \div 0.01 \quad \text{c) } 2.7 \times 0.01, 2.7 \div 0.01$$

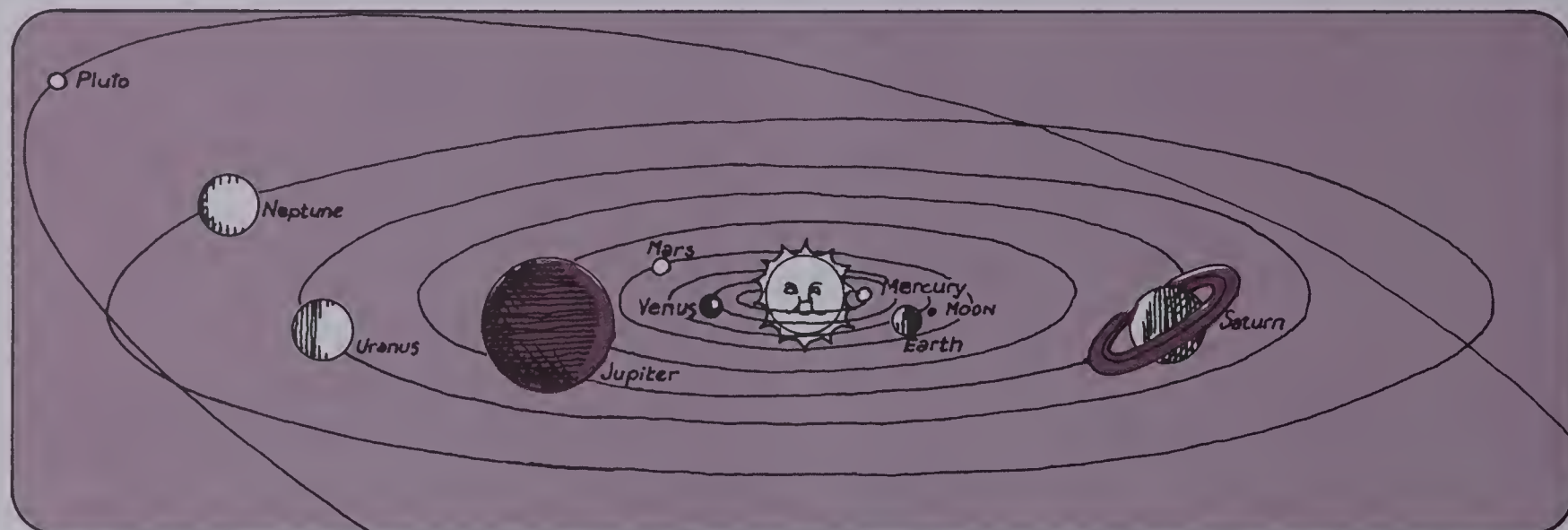
4. Find.

$$\begin{array}{lllll} \text{a) } 9 \times 0.01 & \text{b) } 7 \div 0.01 & \text{c) } 14 \times 0.01 & \text{d) } 14 \div 0.01 & \text{e) } 6.1 \times 0.01 \\ \text{f) } 4.3 \div 0.01 & \text{g) } 289 \times 0.01 & \text{h) } 375 \div 0.01 & \text{i) } 94.2 \times 0.01 & \text{j) } 86.9 \div 0.01 \end{array}$$

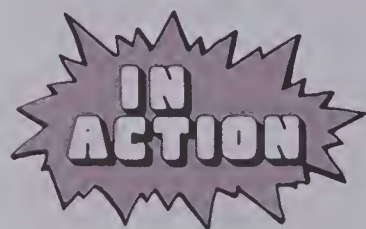
5. Complete the patterns.

$$\begin{array}{llll} \text{a) } 10 \times 1 = ? & \text{b) } 100 \times 1 = ? & \text{c) } 10 \div 1 = ? & \text{d) } 100 \div 1 = ? \\ 10 \times 0.1 = ? & 100 \times 0.1 = ? & 10 \div 0.1 = ? & 100 \div 0.1 = ? \\ 10 \times 0.01 = ? & 100 \times 0.01 = ? & 10 \div 0.01 = ? & 100 \div 0.01 = ? \end{array}$$

The Planets of Our Solar System



Planet	Distance from the sun (millions of kilometres)	Period of revolution	Diameter at equator	Period of rotation
Mercury	57.9	88.0 d	4988 km	88 d
Venus	108.2	224.7 d	12 391 km	243 d
Earth	149.5	365.26 d	12 757 km	23 h 56 min
Mars	227.7	687.0 d	6759 km	24 h 37 min
Jupiter	777.9	11.86 a	142 748 km	9 h 50.5 min
Saturn	1425.9	29.46 a	120 861 km	10 h 14 min
Uranus	2867.8	84.01 a	46 992 km	10 h 49 min
Neptune	4493.3	164.8 a	44 578 km	14 h
Pluto	5896.6	247.7 a	14 001 km	6.39 d



1. Arrange the planets in order of size from largest to smallest.
2. Arrange the planets according to the time it takes them to make a complete rotation, from shortest time to longest time.
3. Express the diameters of each of the following in metres (m).
a) Mercury b) Earth c) Mars d) Pluto

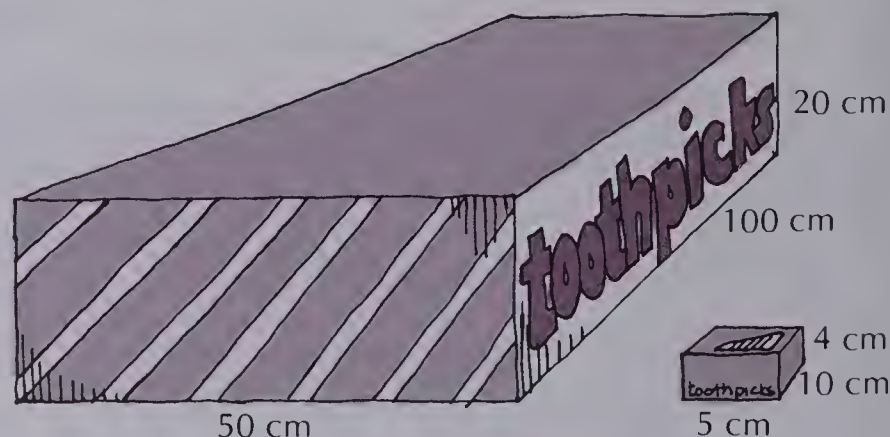


4. Find the difference between the diameters of the following.
 - a) Venus and Earth
 - b) Neptune and Pluto
 - c) Saturn and Mercury
6. What is the difference between the distances from the sun?
 - a) Mercury and Venus
 - b) Earth and Mars
 - c) Saturn and Pluto
 Express your answer in millions of kilometres.
8. How many days will it take for each of the following to make a complete revolution? (1 a = 365 d)
 - a) Jupiter b) Saturn c) Uranus
 - d) Neptune e) Pluto
5. How long will it take for each of the following to rotate?
 - a) Mercury, 6 times
 - b) Venus, 4 times
 - c) Pluto, 9 times
7. How long will it take for each of the following to revolve around the sun?
 - a) Earth, 3 times b) Jupiter, 8 times
 - c) Mars, 6 times
9. The Earth's gravity is about 4 times greater than Mercury's. About how high could you jump on Mercury if you can jump 136 cm on Earth?
10. If you can throw a ball about 75 m, about how far could you throw a ball on Mercury?

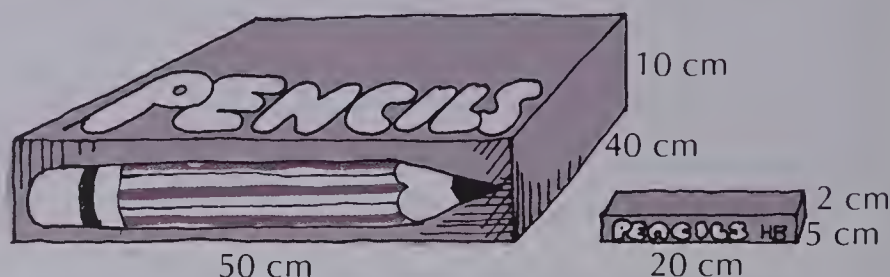


Retrace Your Steps

1. a) Find the volume of each package.
b) How many small packages will fit into a large package?
c) Express the volume of the small package as a per cent of the volume of the large package.



2. a) Find the volume of each package.
b) How many small packages will fit into a large package?
c) Express the volume of the small package as a per cent of the volume of the large package.



3. Add.

a) 36.4	b) 3.46	c) 0.43	d) 156.3	e) 1.37	f) 183.46
19.2	9.20	0.67	97.4	6.30	178.00
18.7	0.46	0.81	37.2	0.46	937.46
<u>77.4</u>	<u>5.11</u>	<u>9.74</u>	<u>93.8</u>	<u>5.00</u>	<u>345.80</u>

4. Find.

a) $15.4 - 6.9$ b) $3.46 - 1.24$ c) $176.3 - 143.8$ d) $94.38 - 81.07$ e) $72.4 - 8.3$

5. 1 pen costs \$0.98.
How much will 20 pens cost?

6. Each student requires 5.8 m of wool thread for an art display. How much wool thread will 32 students require?

7. A track is 120.5 m long. How far will a student travel if he runs 4.5 times around the track?

8. Cloth costs \$8.75/m.
How much will 9.5 m cost?

9. Find.

a) 8×0.1 b) $12 \div 0.01$ c) 34×1 d) $81 \div 0.1$ e) 200×0.1 f) $62 \div 0.1$
g) 4.8×0.01 h) 3.4×0.1 i) $1.8 \div 0.1$ j) $2.4 \div 0.01$ k) 364×0.01 l) $364 \div 0.01$

EXPLORE

ANGLES/Drawing Angles

Suppose you wanted to draw an angle congruent to $\angle MAT$.

You could trace $\angle MAT$.

Another method is to draw an angle using a protractor.

Follow these steps.

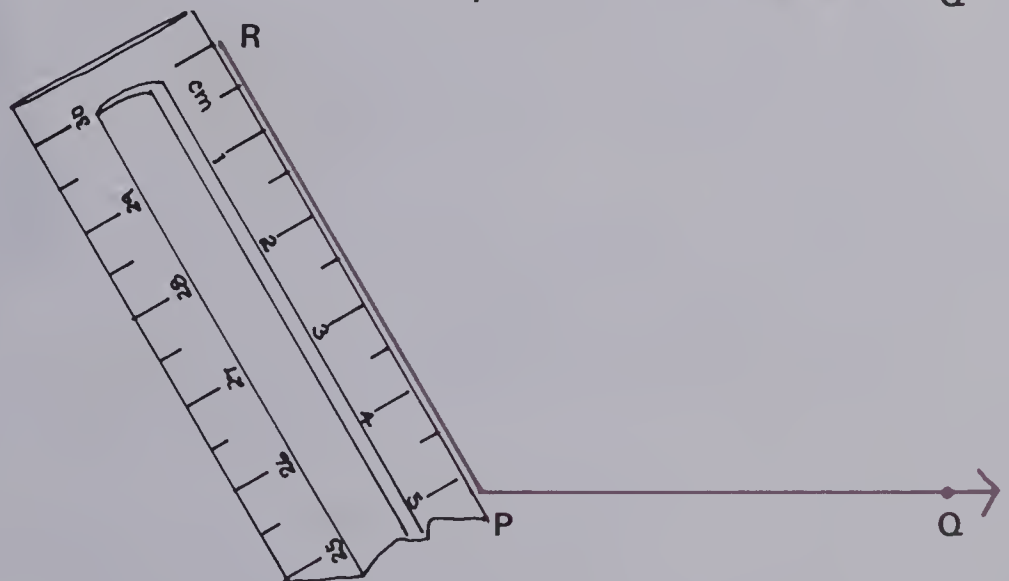
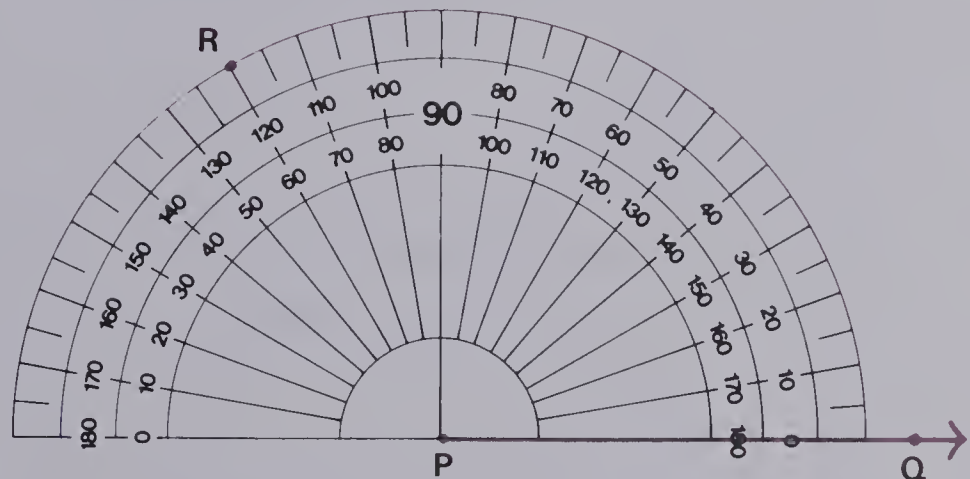
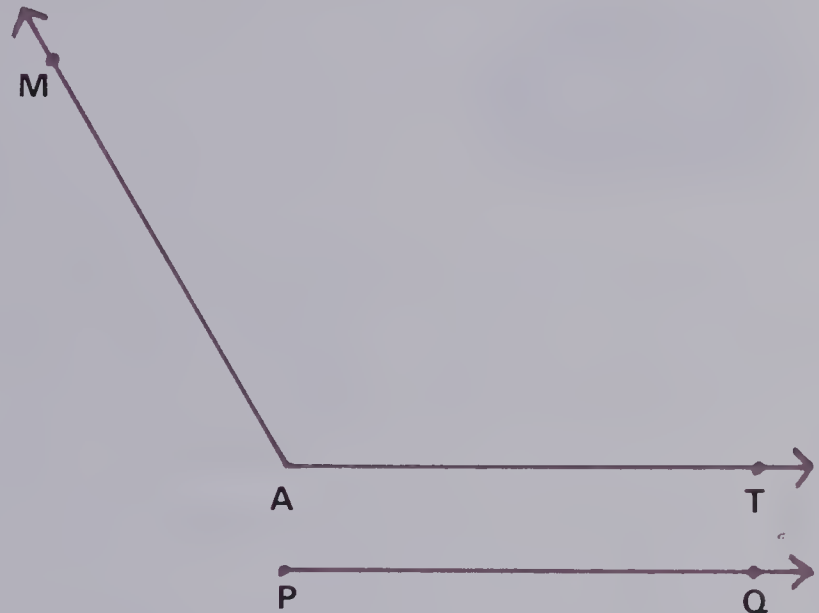
Step 1 Measure $\angle MAT$ using your protractor.
Did you read 120° ?

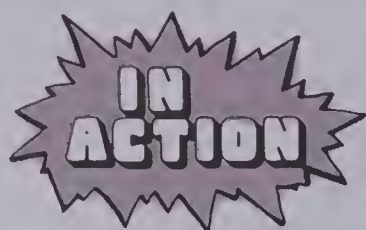
Step 2 Draw a ray, PQ .

Step 3 Place the base line of the protractor on PQ .
Be sure that the centre point of the protractor is on the point, P .
Mark the point, R , corresponding to 120° .

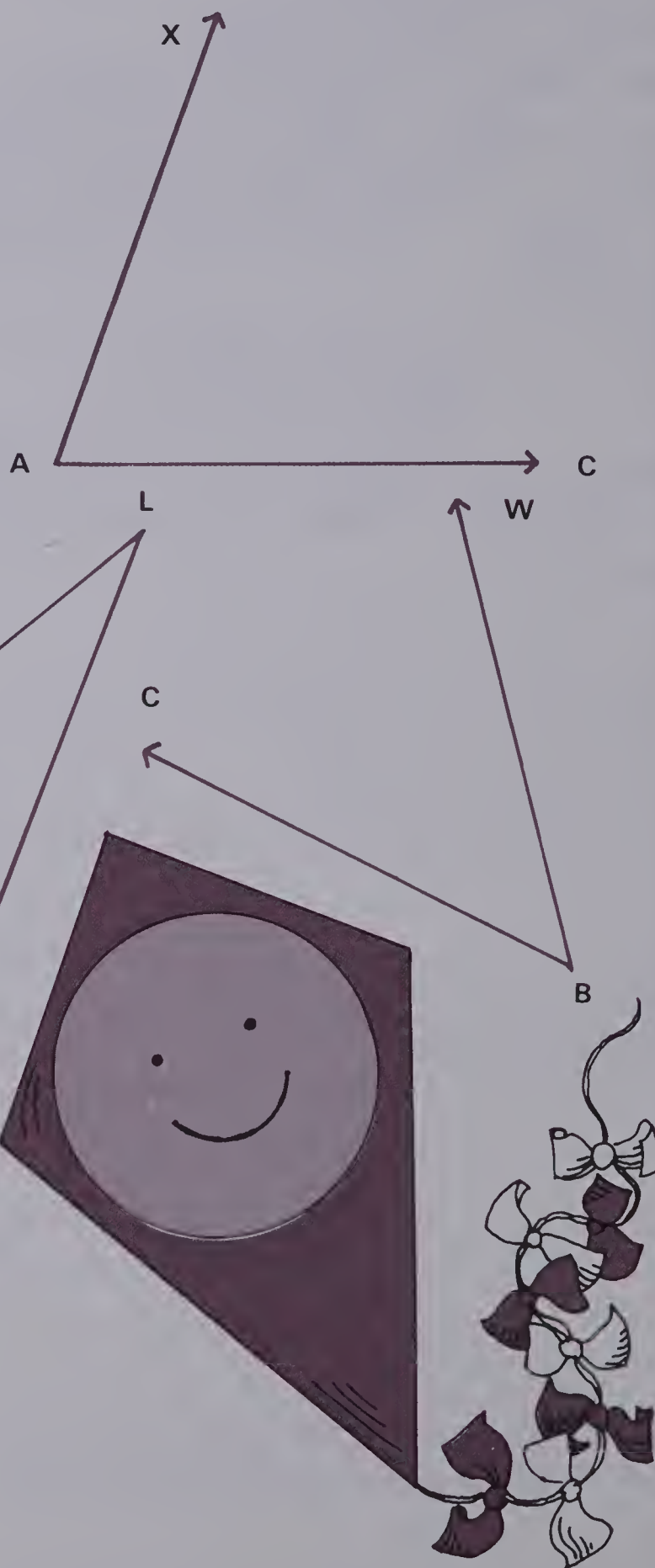
Step 4 Use a ruler to join point R and point P .

Step 5 Measure $\angle RPQ$ to see whether it is congruent to $\angle MAT$.



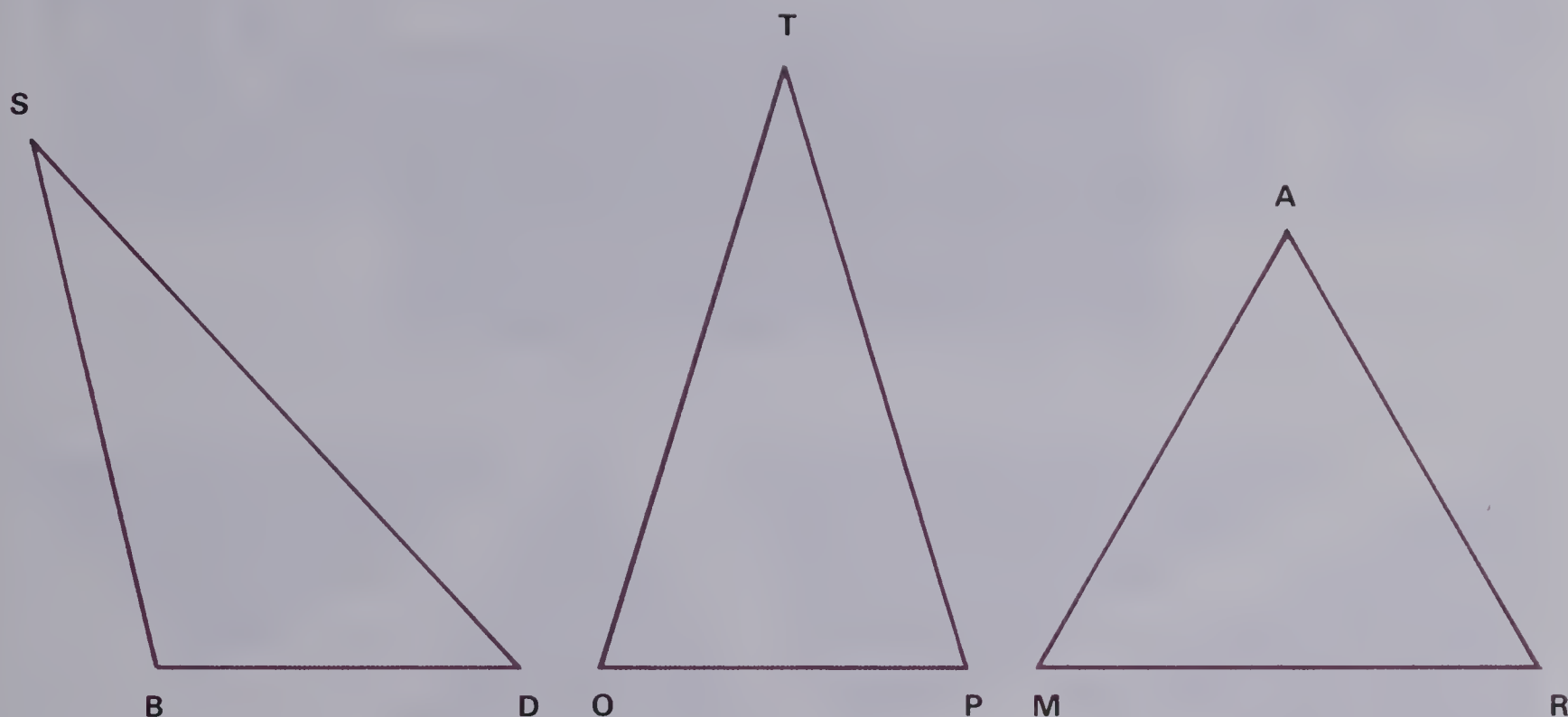


1. Draw an angle congruent to $\angle XAC$.
2. a) Draw an angle 10° larger than $\angle XAC$.
b) Label the angle CMF.
c) What is the measurement of $\angle CMF$?
3. a) Draw an angle 15° smaller than $\angle XAC$.
b) Label the angle HDF.
c) What is the measurement of $\angle HDF$?
4. Draw an angle equal to the sum of these 2 angles. Label the angle SRT. What is the measurement of $\angle SRT$?
5. Draw an angle twice the size of a right angle. Label the angle SBG. What is the measurement of $\angle SBG$? What is the name of the angle?
6. Measure the angles of this kite. Use your protractor to draw a congruent figure.



EXPLORE

KINDS OF TRIANGLES



Examine triangles AMR, TOP and SBD carefully.

List some things about the 3 triangles that are the same.

List some things about them that are different.

A triangle that has 3 sides the same length
is called an **equilateral triangle**.

Which one is equilateral?

A triangle that has 2 sides the same length
is called an **isosceles triangle**.

Which triangle is isosceles?

A triangle that has 0 sides the same length
is called a **scalene triangle**.

Which triangle is scalene?

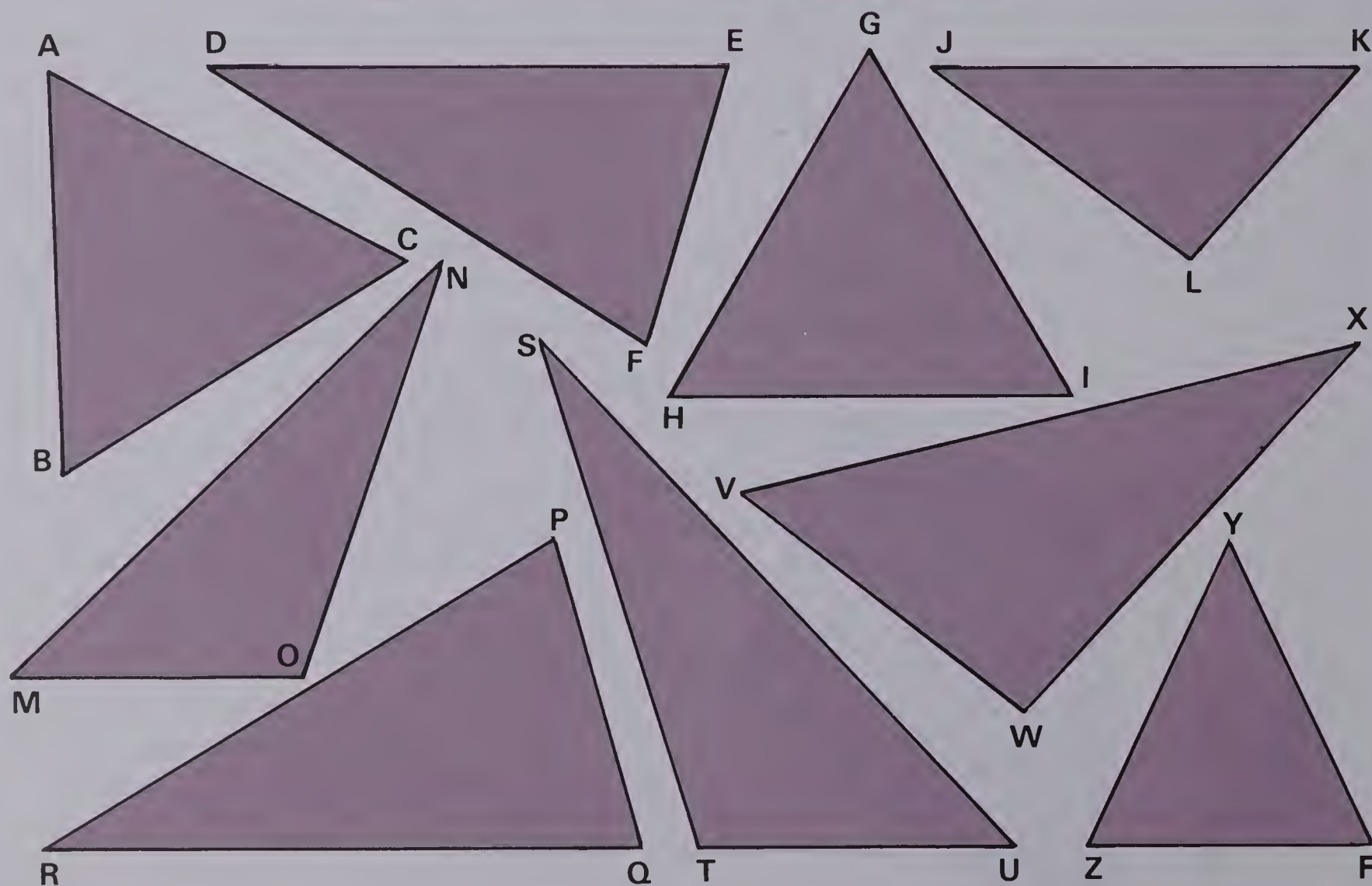
What can you discover about the size of the angles
of an equilateral triangle?

an isosceles triangle? a scalene triangle?



1. a) Draw a chart and sort the triangles.

Equilateral triangles	Isosceles triangles	Scalene triangles



2. Use tracing paper to compare the measurements of the angles in
a) an equilateral triangle b) an isosceles triangle c) a scalene triangle.



3.
 - a) Draw a line segment 8 cm long. Name the segment CB.
 - b) Use your protractor to draw an angle ACB of 60° . Make side AC 8 cm long.
 - c) Join points A and B. Measure line segment AB. What kind of triangle have you drawn?
5. Draw an equilateral triangle with sides 6 cm long. Name your triangle.
7. Cut out models of the 3 triangles found on page 231, or make your own equilateral, isosceles, and scalene triangle cut-outs. Label your triangles the same way as on page 231.
 - a) Flip and trace the equilateral triangle about side AR. What kind of figure do you create?
 - b) Flip and trace the isosceles triangle about side TP. What kind of figure do you create?
 - c) Flip and trace the scalene triangle about side BD. What kind of figure do you create?
4.
 - a) Draw a line segment 8 cm long. Name the segment TM.
 - b) Use your protractor to draw an angle MTX of 70° .
 - c) Use your protractor to draw an angle TMX of 70° . This will locate point X.
 - d) Measure sides XM and XT. What kind of triangle have you drawn?
6. Draw an isosceles triangle with 2 angles each measuring 80° . Name your triangle.
8. Continue to flip and trace each triangle in Question 7 to see if you can cover an area without leaving any space between the triangles drawn.
9. Draw a scalene triangle. Measure its sides and angles to make sure that it is scalene.
10. Learn to spell the names of the 3 kinds of triangles.

EXPLORE

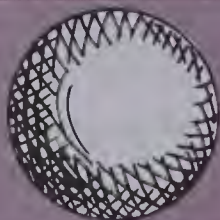
SOLIDS

Make a list of objects that look like these geometric solids.

cylinder



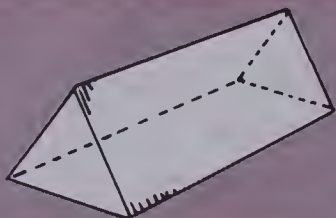
sphere



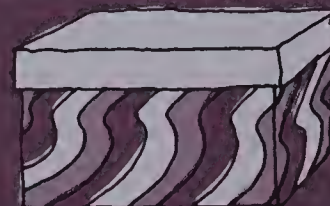
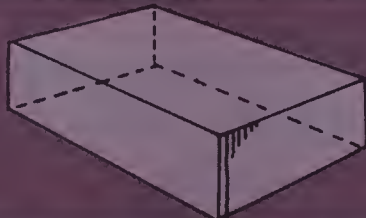
cone



triangular prism



rectangular prism

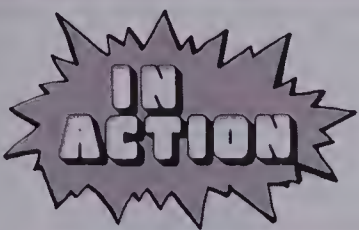


square pyramid



triangular pyramid



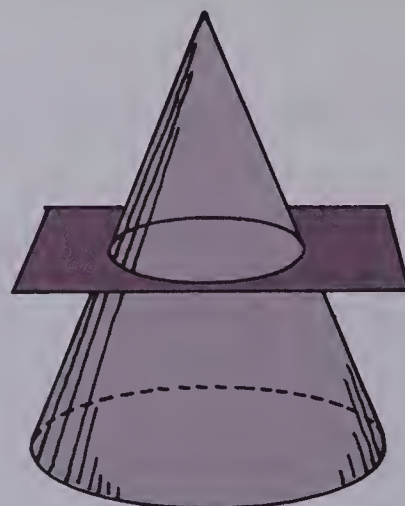


1. Draw the chart in your workbook and complete it.

Solid	Number of faces	Number of vertices	Number of edges	Other properties
 cylinder	2	0	0	1 curved surface
 sphere				
 cone				
 triangular prism				
 rectangular prism				
 square pyramid				
 triangular pyramid				

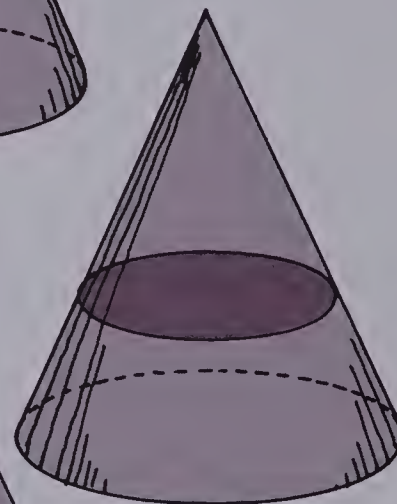
Planes of Symmetry

Suppose we cut a cone like this.
What would the cross section
of the cone look like?

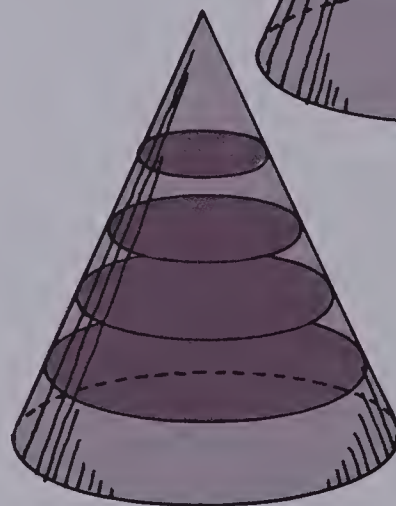


It would look like this!

If we cut it again, a little closer to the base,
what would the new cross section look like?
How would it compare with the first section?



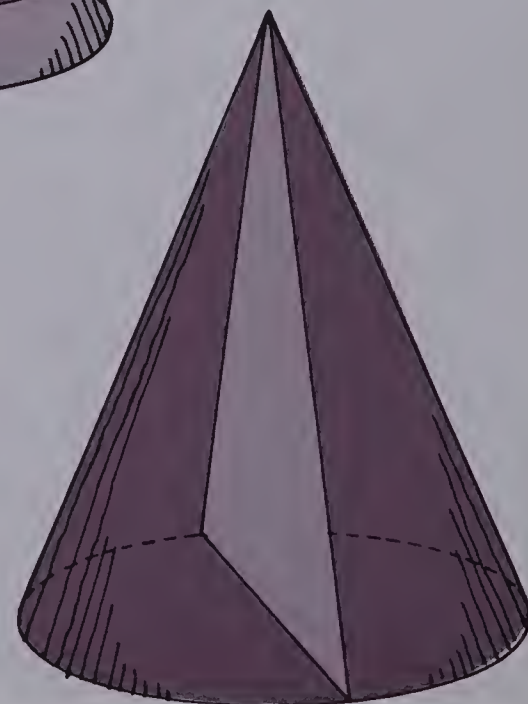
Use compasses to draw a series of circles
representing these sections of a cone.

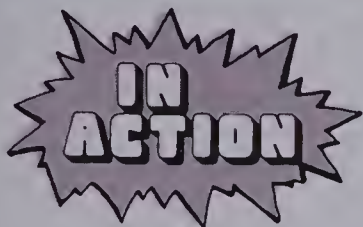


Suppose you cut a cone vertically through
the vertex to the base.
Draw a diagram to illustrate the section of the cone
that would result.

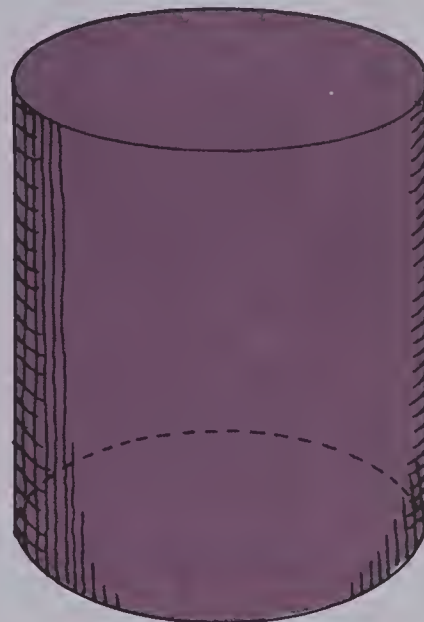
This section is called a **plane of symmetry**.

The 2 pieces of the cone are congruent.
How many planes of symmetry does a cone have?
Can you show a plane of symmetry with a horizontal cut?

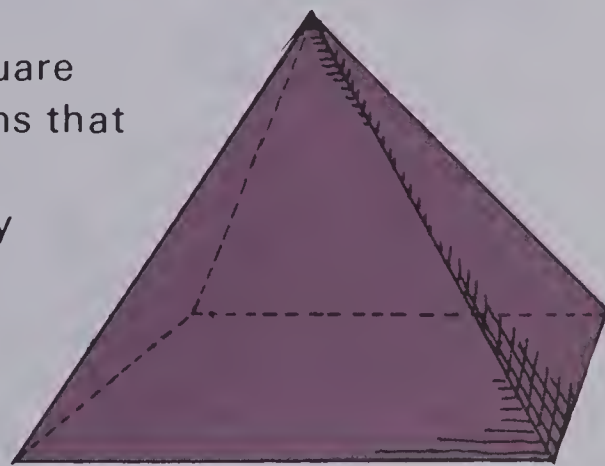




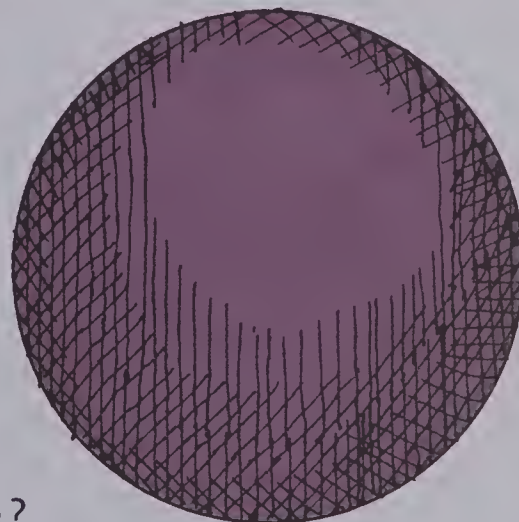
1. a) Think about a series of cuts through a cylinder, each cut parallel to the base.
What would be special about the set of sections that would result?
b) Think about a vertical cut through a cylinder from the top to the base.
Draw a diagram to represent the plane of symmetry.
c) How many planes of symmetry does a cylinder have?



2. a) Think of a series of horizontal cuts through a square pyramid. Draw diagrams to represent the sections that would result.
b) Draw a diagram to represent a plane of symmetry for a square pyramid.
c) How many planes of symmetry has a square pyramid?



3. a) Suppose you made a series of 5 cuts through a sphere, each parallel to the other cuts. Draw diagrams to illustrate the series of sections of the sphere that would result.
b) How many planes of symmetry has a sphere?



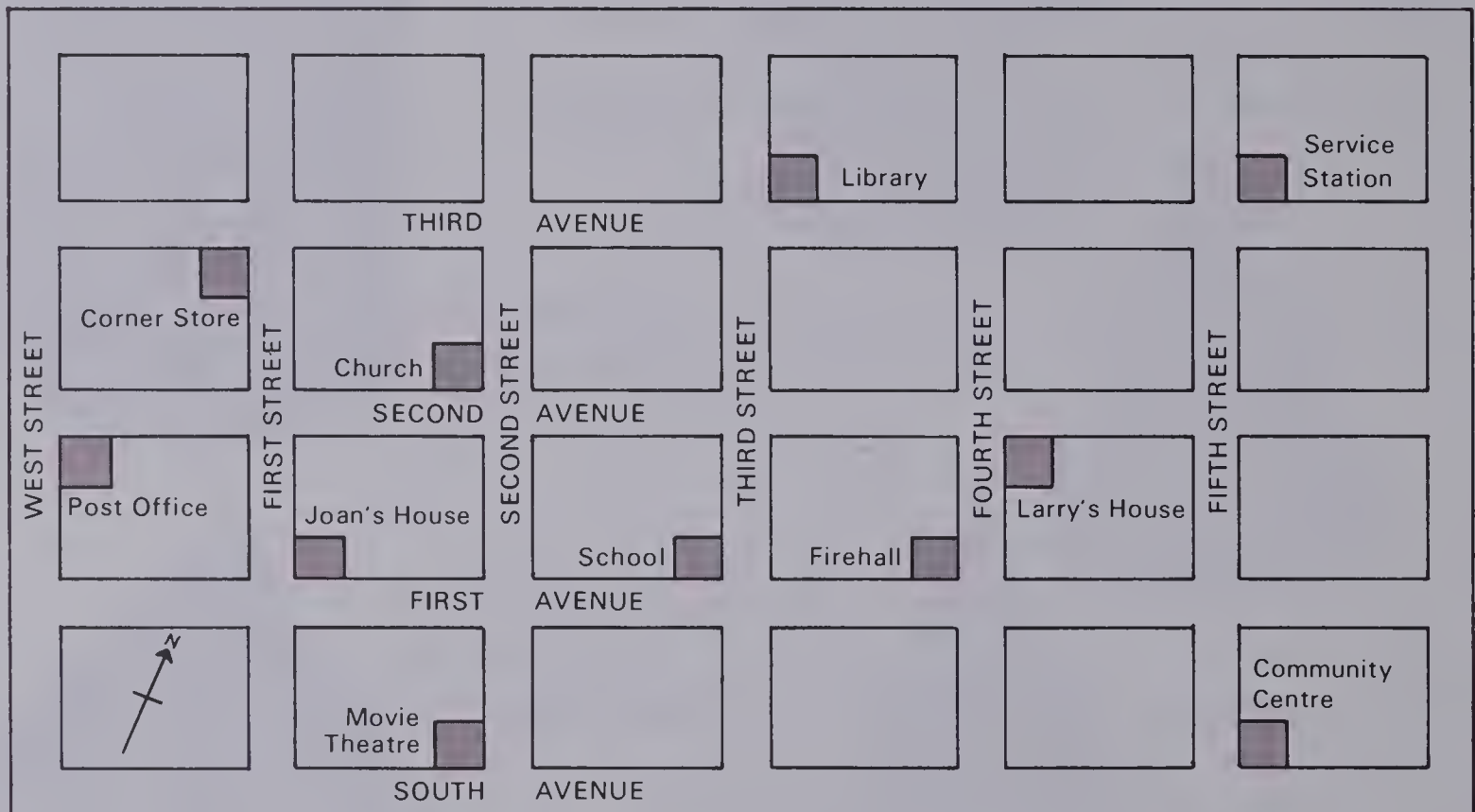
4. What solid would you cut, and how would you cut it, to obtain planes of symmetry shaped like
a) a rectangle b) a triangle c) a square d) a circle?

EXPLORE

ORDERED PAIRS/Naming Positions

A city uses a system of streets and avenues.
The system makes it easy to locate places.

School Community



Joan's house is at the intersection of First Street and First Avenue.

The school is at Third Street and ? Avenue.

The church is at ? Street and ? Avenue.

The corner store is at ? and ?.

We agree to name the street first and the avenue second.

Name the street and avenue that will locate:

the service station

Larry's house

the community centre

the library

the movie theatre

the firehall

the post office.



We can represent the street map by a grid.

Let's call West Street, Zero Street, and South Avenue, Zero Avenue.

4th Ave.	(0, 4)	(1, 4)	(2, 4)	(3, 4)	(4, 4)	(5, 4)	(6, 4)
3rd Ave.	(0, 3)	(1, 3)	(2, 3)	(3, 3)	(4, 3)	(5, 3)	(6, 3)
2nd Ave.	(0, 2)	(1, 2)	(2, 2)	(3, 2)	(4, 2)	(5, 2)	(6, 2)
1st Ave.	(0, 1)	(1, 1)	(2, 1)	(3, 1)	(4, 1)	(5, 1)	(6, 1)
	(0, 0)	(1, 0)	(2, 0)	(3, 0)	(4, 0)	(5, 0)	(6, 0)
	1st St.	2nd St.	Zero Avenue 3rd St.	4th St.	5th St.	6th St.	

We use an **ordered pair** of numbers to name an intersection.

The first number of the pair tells the street.

The second number of the pair tells the avenue.

The intersection of Second Street and First Avenue is shown as (2, 1).

Name the intersection of:

Third Street and First Avenue

Second Street and Second Avenue

Fourth Street and Second Avenue.

The intersection of Zero Street and Zero Avenue is (0, 0).

This is the **origin** or starting position for giving directions on the map.

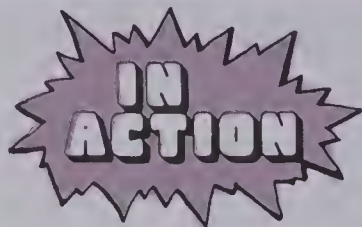
Name the intersection of:

Zero Street and First Avenue

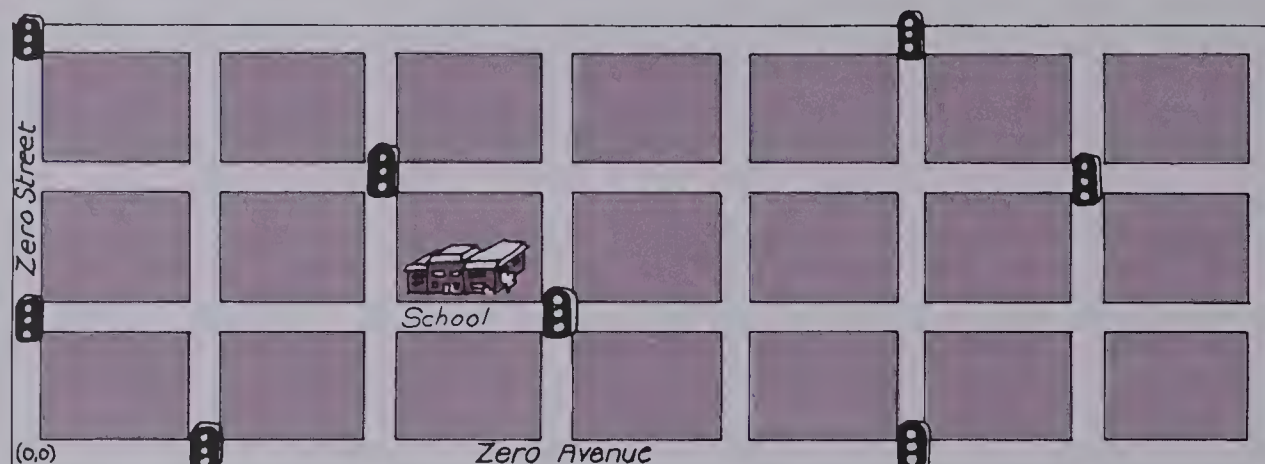
Zero Street and Third Avenue

Third Street and Zero Avenue

First Street and Zero Avenue.

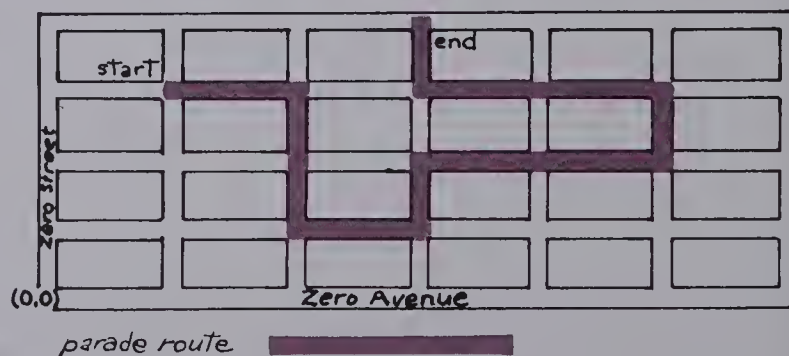


1. This map shows the traffic lights for a school district.



Write the number pairs that name the intersections with traffic lights.

2. Write the number pairs that name the following intersections. Start at $(0, 0)$.
 - a) Go East 2 blocks then North 1 block.
 - b) Go East 4 blocks then North 3 blocks.
 - c) Go East 5 blocks then North 4 blocks.
 - d) Go East 1 block then North 5 blocks.
 - e) Go East 3 blocks.
 - f) Go North 2 blocks.
3. Draw a street-avenue map. Mark Zero Street to Sixth Street and Zero Avenue to Fifth Avenue. On your map, write the number pair that names:
 - a) the intersection of Third Street and Fourth Avenue
 - b) the intersection of Sixth Street and Second Avenue
 - c) the intersection of Zero Street and Fifth Avenue
 - d) the intersection of Second Street and Zero Avenue
 - e) the intersection of Sixth Street and Fifth Avenue
 - f) the intersection of Zero Street and Third Avenue.
4.
 - a) Name the intersection where the parade starts.
 - b) Name the intersection where the parade ends.
 - c) Name the intersections, in order, that the parade passes through, from the beginning to the end.





Naming Points

We call the intersection of the horizontal axis and the vertical axis the **origin** and name it $(0, 0)$.

We locate point A by starting at $(0, 0)$ and moving to the right 2 units and up 3 units. We name the point $(2, 3)$.

We locate point D by starting at $(0, 0)$ and moving to the right 3 units and up ? units. We name point D $(?, 6)$.

How would we locate and name point R?

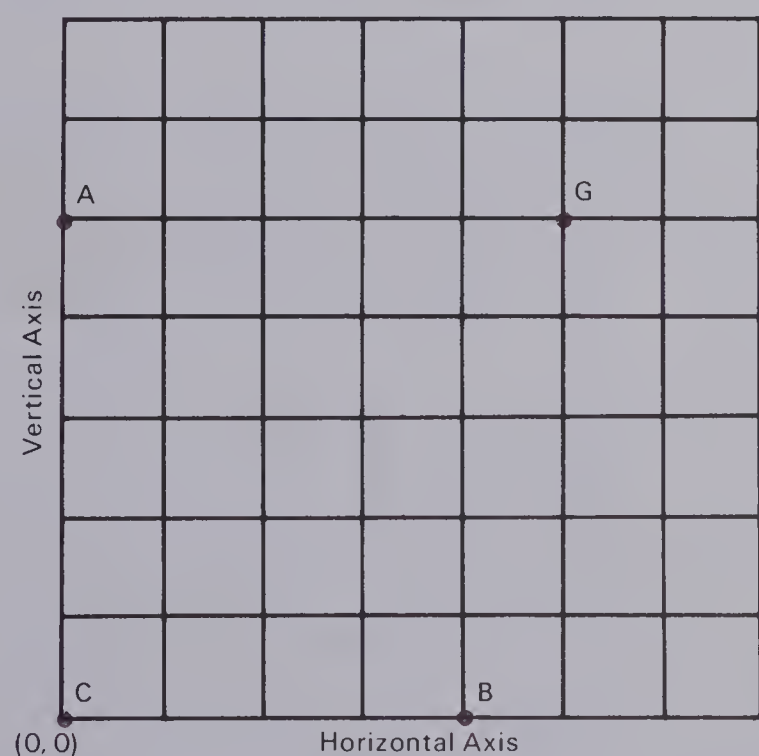
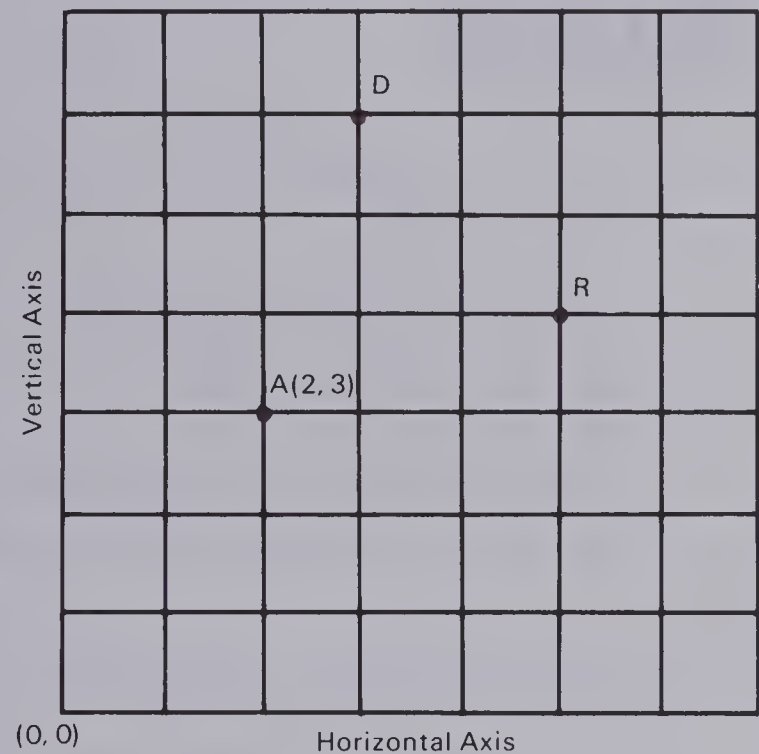
To name any point by an ordered pair, we agree to move along the horizontal axis first and along the vertical axis second.

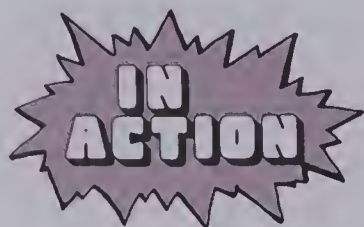
Point A is on the vertical axis.
We locate point A by moving to the right 0 units and up 5 units.
We name point A $(0, 5)$.

Point B is on the horizontal axis.
We locate point B by moving to the right ? units and up 0 units.
We name point B $(4, ?)$.

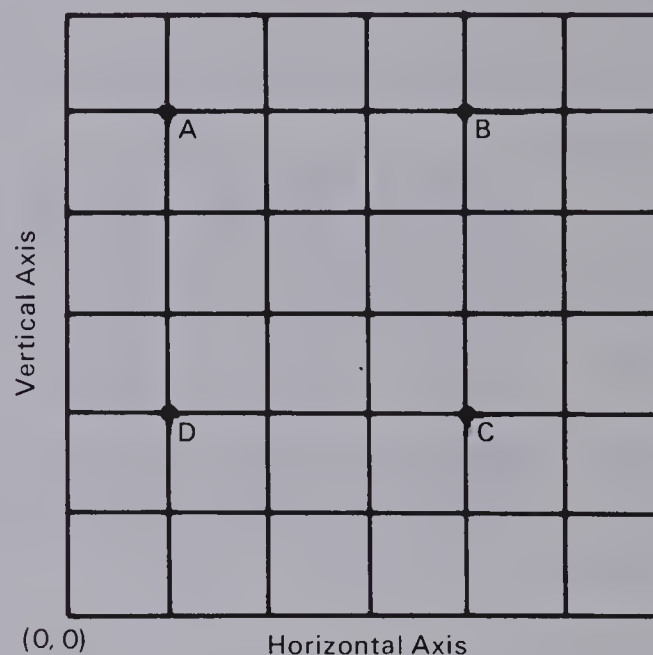
We locate point C by moving to the right ? units and up ? units.
We name point C $(?, ?)$.

Name point G.



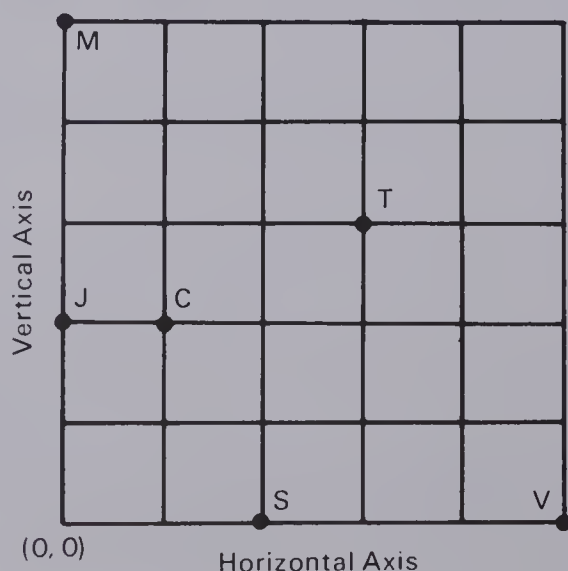


1. a) Write the ordered pairs for points A, B, C, and D.
 b) Think of joining A to B, B to C, C to D, and D to A. What kind of figure would be formed?
 c) What grid points would line segment AC pass through? Write the ordered pairs for these points.



2. On a grid, mark the origin (0, 0) and locate the following points:
 a) G—to the right 3 units, up 1 unit
 b) J—to the right 1 unit, up 3 units
 c) T—to the right 2 units, up 4 units
 d) Join the 3 points with straight lines. What figure did you make?

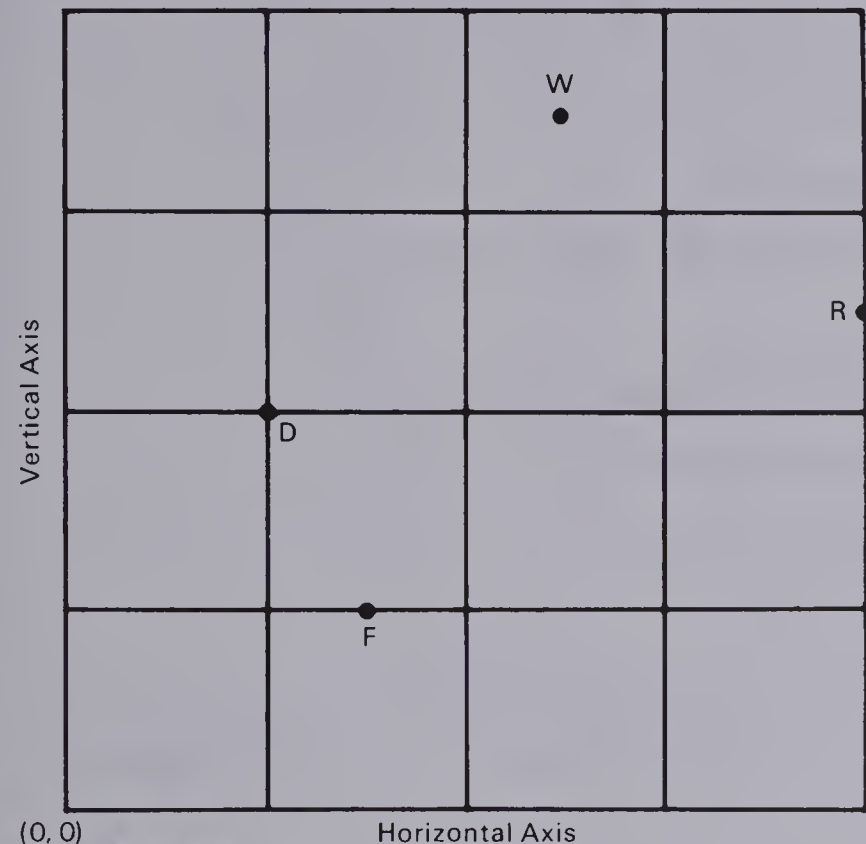
4. Write the ordered pairs for points T, S, V, C, J, and M.



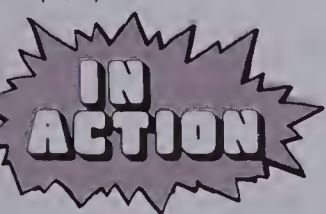
3. On a grid, show the horizontal axis, the vertical axis, and the origin. Locate positions for the following sets of ordered pairs. Tell the kind of figure you made by joining the points in order.
 a) (1, 3), (4, 3), (4, 5), (1, 5)
 b) (1, 1), (4, 1), (5, 3), (2, 3)
 c) (1, 1), (4, 1), (3, 3), (2, 3)
 d) (1, 1), (4, 1), (4, 4), (1, 4)
5. On a grid, show the horizontal axis, the vertical axis, and the origin. Locate positions for the following sets of ordered pairs. Tell the kind of figure you made by joining the points in order.
 a) (4, 4), (0, 4), (4, 0)
 b) (0, 0), (4, 0), (4, 3), (0, 3)
 c) (1, 2), (0, 0), (3, 0), (4, 2)
 d) (2, 3), (2, 0), (5, 0), (5, 3)



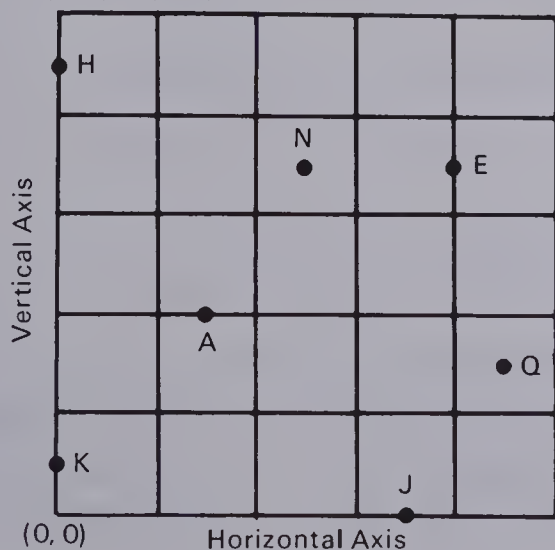
Locating a Point Not at an Intersection



Point D is located to the right 1 unit and up 2 units.
 Point D is located at ?
 How many units to the right of (0, 0) is point F?
 It is 1.5 units to the right of (0, 0).
 We write the ordered pair for F as (1.5, 1).
 How many units up from (0, 0) is point R?
 It is 2.5 units up from (0, 0).
 We write the ordered pair for R as (4, ?).
 How do we name the position for point W?
 W is ? units to the right of (0, 0) and up ? units.
 We name the point (?, ?).



1. Name the position of the following points:
 J, A, E, H, K, N, and Q.



2. On a grid, show the horizontal axis, the vertical axis, and the origin. Locate positions for the following sets of ordered pairs: (3, 1.5), (1.5, 2), (0.5, 4), (2.5, 1.5), (5, 0.5), and (4.5, 4.5).
3. On a grid, show the horizontal axis, the vertical axis, and the origin. Locate positions for the following sets of ordered pairs: (0, 5), (0, 0), (5, 0), and (5, 5). Join (0, 5) to (5, 0). Join (0, 0) to (5, 5). Name the point of intersection of these 2 lines.

RECALL LONG DIVISION

A. Recall dividing a whole number by a whole number, no remainder

$$\begin{array}{r} 24 \\ 17 \overline{) 408} \\ \underline{34} \\ 68 \\ \underline{68} \\ 0 \end{array}$$

Think

How many 17's are there in 40? – About 2
Write 2 above the 0.

$17 \times 2 = 34$ Write 34 below the 40.

Subtract.

Bring down the 8 beside the 6.

How many 17's are there in 68? – 4

$17 \times 4 = 68$ Write 68 below the 68.

Subtract.

$$408 \div 17 = 24$$

1. Divide.

a) 414 by 18

b) 432 by 16

c) 465 by 15

d) 559 by 13

e) 546 by 21

f) 644 by 23

g) 972 by 27

h) 899 by 31

2. Divide.

a) 1184 by 32

b) 1073 by 37

c) 1462 by 86

d) 1764 by 98

e) 2666 by 43

f) 3626 by 74

g) 3045 by 35

h) 3182 by 43

B. Recall dividing a whole number by a whole number, with remainder

$$\begin{array}{r} 46 \\ 28 \overline{) 1296} \\ \underline{112} \\ 176 \\ \underline{168} \\ 8 \end{array}$$

Think

How many 28's are there in 129? – About 4

How many 28's are there in 176? – About 6

$$1296 \div 28 \text{ is } 46 \text{ with remainder } 8$$

Divide.

a) 383 by 14

b) 542 by 19

c) 538 by 21

d) 1068 by 27

e) 1429 by 34

f) 2239 by 43

g) 1601 by 19

h) 1385 by 28

i) 2690 by 32

j) 2384 by 41

k) 5399 by 65

l) 1534 by 15

m) 3638 by 17

n) 5116 by 24

o) 7651 by 34

p) 9421 by 43

C. Recall dividing a whole number by a whole number, expressing the quotient to the nearest tenth

$$\begin{array}{r}
 48.17 \\
 23 \overline{) 1108.00} \\
 \underline{92} \\
 188 \\
 \underline{184} \\
 40 \\
 \underline{23} \\
 170 \\
 \underline{161} \\
 9
 \end{array}$$

Think

How many 23's are there in 110?—About 4

How many 23's are there in 188?—About 8

For 1108, write 1108.00 and continue dividing.

How many 23's are there in 40?—About 1

How many 23's are there in 170?—About 7

In the quotient 48.17, $7 > 5$. $1108 \div 23 = 48.2$, to the nearest tenth.

Divide. Express the quotient to the nearest tenth.

a) 369 by 13

b) 364 by 15

c) 371 by 15

d) 600 by 19

e) 735 by 14

f) 905 by 17

g) 786 by 21

h) 1478 by 27

D. Recall dividing a decimal number by a whole number

$$\begin{array}{r}
 3.88 \\
 29 \overline{) 112.54} \\
 \underline{87} \\
 255 \\
 \underline{232} \\
 234 \\
 \underline{232} \\
 2
 \end{array}$$

Think

How many 29's are there in 112?—About 3

Place a decimal point in the quotient above the decimal point in the number and continue.

How many 29's are there in 255?—About 8

How many 29's are there in 234?—About 8

In the quotient 3.88, $8 > 5$. $112.54 \div 29 = 3.9$, to the nearest tenth.

Divide. Express the quotient to the nearest tenth.

a) 124.61 by 18

b) 273.92 by 13

c) 345.81 by 15

d) 345.81 by 16

e) 457.38 by 11

f) 759.28 by 23

g) 496.51 by 24

h) 459.51 by 24

i) 587.26 by 19

j) 824.69 by 31

k) 928.43 by 47

l) 1287.31 by 47

E. Recall dividing a whole number by a decimal number

Divide 97 by 8.4.

$$\begin{array}{r} 11.54 \\ 84 \overline{) 970.00} \\ \underline{84} \\ 130 \\ \underline{84} \\ 460 \\ \underline{420} \\ 400 \\ \underline{336} \\ 64 \end{array}$$

Think

$$\begin{aligned} 97 \div 8.4 &= (97 \times 10) \div (8.4 \times 10) \\ &= 970 \div 84 \end{aligned}$$

For 970, you can write 970.00.

$$97 \div 8.4 = 11.5, \text{ to the nearest tenth}$$

Divide. Express the quotient to the nearest tenth.

- | | | | |
|----------------|----------------|----------------|----------------|
| a) 53 by 7.1 | b) 74 by 6.5 | c) 83 by 9.2 | d) 97 by 7.8 |
| e) 104 by 9.3 | f) 129 by 11.2 | g) 175 by 12.8 | h) 194 by 13.2 |
| i) 273 by 12.8 | j) 379 by 14.4 | k) 468 by 13.9 | l) 849 by 17.4 |

F. Recall dividing a decimal number by a decimal number

Divide 753.81 by 9.3.

$$\begin{array}{r} 81.05 \\ 93 \overline{) 7538.10} \\ \underline{744} \\ 98 \\ \underline{93} \\ 510 \\ \underline{465} \\ 45 \end{array}$$

Think

$$\begin{aligned} 753.81 \div 9.3 &= (753.81 \times 10) \div (9.3 \times 10) \\ &= 7538.1 \div 93 \end{aligned}$$

$$753.81 \div 9.3 = 81.1, \text{ to the nearest tenth}$$

Divide. Express the quotient to the nearest tenth.

- | | | |
|------------------|------------------|------------------|
| a) 413.51 by 4.8 | b) 572.45 by 3.9 | c) 618.32 by 5.4 |
| d) 453.68 by 8.1 | e) 736.20 by 6.4 | f) 807.50 by 9.2 |
| g) 932.70 by 8.2 | h) 578.30 by 8.9 | i) 997.81 by 7.5 |



IN ACTION

1. Divide.

a) 266 by 14

b) 306 by 17

c) 285 by 15

d) 304 by 19

e) 252 by 21

f) 368 by 23

g) 475 by 25

h) 572 by 26

2. Divide. Express the quotient to the nearest tenth.

a) 328 by 17

b) 242 by 12

c) 315 by 16

d) 649 by 23

e) 794 by 17

f) 929 by 18

g) 925 by 19

h) 729 by 21

i) 998 by 26

j) 1509 by 32

k) 1394 by 26

l) 2451 by 38

3. a) 64.2 by 7

b) 71.9 by 8

c) 49.9 by 5

d) 53.7 by 6

e) 86.1 by 5

f) 88.9 by 7

g) 94.8 by 9

h) 98.9 by 9

4. a) 107.4 by 6

b) 112.3 by 5

c) 118.8 by 8

d) 117.9 by 9

e) 131.7 by 8

f) 142.9 by 6

g) 167.5 by 9

h) 174.8 by 7

5. a) 67 by 3.8

b) 59 by 4.6

c) 73 by 5.2

d) 81 by 7.6

e) 90 by 8.4

f) 80 by 5.5

g) 98 by 9.1

h) 97 by 6.9

6. a) 78.3 by 5.1

b) 84.2 by 6.4

c) 92.7 by 3.8

d) 89.7 by 4.8

e) 105.4 by 7.8

f) 109.6 by 7.5

g) 118.2 by 8.1

h) 127.4 by 9.8

i) 207.6 by 12.8

j) 224.3 by 14.5

k) 237.6 by 16.4

l) 352.8 by 17.2

7. Divide. Continue the division until the remainder is 0.

a) $\frac{1}{4}$

b) $\frac{1}{5}$

c) $\frac{1}{8}$

d) $\frac{2}{8}$

e) $\frac{1}{25}$

f) $\frac{3}{4}$

g) $\frac{7}{8}$

8. Express as a decimal and as a per cent.

a) $\frac{1}{4} = 0.25$ or 25%

b) $\frac{3}{5}$

c) $\frac{7}{10}$

d) $\frac{4}{25}$

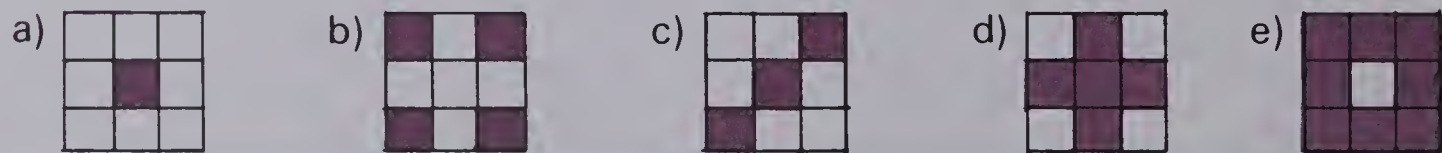
e) $\frac{5}{8}$

f) $\frac{7}{8}$

Unit 3, Check 1

Check your progress. The answers are on page 256.

1. Complete the chart to compare the number of coloured squares to the number of white squares.



Pattern	Comparison	Ratio form	Fraction
a)	1 to 8		
b)		4:5	
c)			$\frac{3}{6}$
d)			
e)			

2. Complete.

	Ratio	Fraction	Equivalent least-terms fraction
a)	5:10		
b)	4:28		
c)	9:21		

	Ratio	Fraction	Equivalent least-terms fraction
d)	40:70		
e)	8:24		
f)	12:36		

3. Write equivalent ratios.

a) $1:5 = ? : 10$ b) $2:6 = 6 : ?$ c) $1 : ? = 3 : 9$ d) $? : 4 = 6 : 12$ e) $3 : 5 = ? : 25$

4. A train travels 180 km in 2 h. If it travels at the same rate, how far will it travel in a) 1 h b) 3 h c) 0.5 h d) 2.5 h e) 4 h?

5. Express as a per cent.

a) 40:100

b) $\frac{24}{100}$

c) 0.8:100

d) $\frac{0.3}{100}$

e) 130:100

f) $\frac{200}{100}$

g) 1.5:100

h) $\frac{3.2}{100}$

i) $\frac{224}{100}$

j) 107:100

k) 5:100

l) $\frac{12.5}{100}$

6. Express as a fraction.

a) 28% b) 90% c) 8% d) 0.4% e) 110% f) 2.5% g) 100%

7. Express each part of Question 6 as a ratio.

Unit 3, Practice 1

1. Express each of the following as a ratio and as a fraction.
a) 4 red cards to 2 black cards b) 6 girls to 2 boys c) 12 cookies for 4 boys
d) 1 teacher to 30 pupils e) 10 pencils for 5 girls f) 3 wins to 1 loss
2. 3 students played 8 games. Complete the chart.

Players	Games won	Games lost	Games tied	Ratio games won to games played	Ratio games won to games lost	Ratio games won to games tied
Tony	3	4	1			
Shelagh	4	2	2			
Gloria	1	6	1			

3. Express as a per cent.
a) 60:100 b) $\frac{30}{100}$ c) 50:100 d) $\frac{50}{100}$ e) 12:100 f) $\frac{45}{100}$
g) 30.5:100 h) $\frac{10.5}{100}$ i) 5:100 j) $\frac{3}{100}$ k) 91.5:100 l) $\frac{46.3}{100}$
4. Express as a fraction.
a) 80% b) 65% c) 14% d) 10.5% e) 4% f) 25% g) 7.5%
5. Write the ratio for each per cent.
a) 95% b) 30% c) 24.8% d) 2.5% e) 99.9% f) 50% g) 16.8%
6. Mrs. Sweet found that 68 of 100 children liked chocolate cake.
a) What is the ratio of children who like chocolate cake to those who don't? b) What per cent of the children like chocolate cake?
c) What per cent of the children do not like chocolate cake?
7. Complete.

f	g	$\frac{f}{100}$	$\frac{f}{100}$ as a per cent	$g:f$	$\frac{g}{100}$	$\frac{g}{100}$ as a per cent	$\frac{f}{g}$
4	2						
10	4						
				4:5			
				50:25			
5					$\frac{20}{100}$		

Unit 3, Check 2

Check your progress. The answers are on page 256.

1. What per cent is

- a) 3 of 5 b) 6 of 10 c) 12 of 25 d) 25 of 50 e) 2 of 4 f) 1 of 20?

2. Complete.

- a) $0.4 = \frac{?}{10}$ b) $0.8 = \frac{?}{10}$ c) $1.3 = \frac{?}{10}$ d) $0.5 = \frac{?}{10}$ e) $2.7 = \frac{?}{10}$
 $= \frac{?}{100}$ $= \frac{?}{100}$ $= \frac{?}{100}$ $= \frac{?}{100}$ $= \frac{?}{100}$
 $= ?\%$ $= ?\%$ $= ?\%$ $= ?\%$ $= ?\%$
- f) $0.21 = \frac{?}{100}$ g) $0.33 = \frac{?}{100}$ h) $1.25 = \frac{?}{100}$ i) $2.65 = \frac{?}{100}$ j) $0.05 = \frac{?}{100}$
 $= ?\%$ $= ?\%$ $= ?\%$ $= ?\%$ $= ?\%$

3. Express each per cent as a decimal.

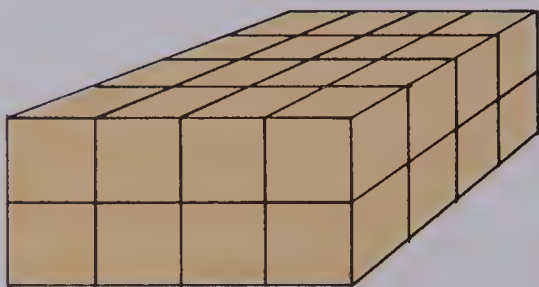
- a) 10% b) 25% c) 33% d) 5% e) 8% f) 110% g) 200% h) 85%

4. Find.

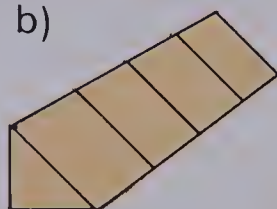
- a) 5% of 30 b) 12% of 40 c) 90% of 15 d) 48% of 50 e) 2% of 80
f) 21% of 150 g) 60% of 200 h) 50% of 400 i) 25% of 375 j) 66% of 80

5. Find the volume of each structure. Each small cube is 1 cm^3 .

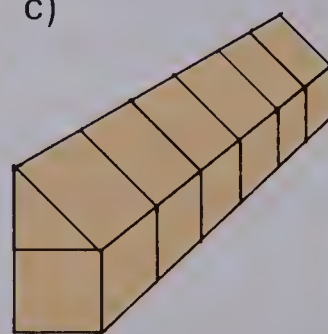
a)



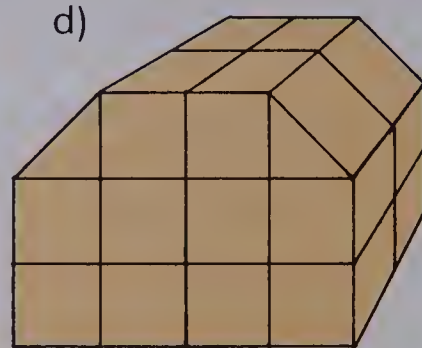
b)



c)



d)



6. Calculate the volume of:

- a) a rectangular prism
area of base = 24 cm^2
height = 6 cm

- c) a cylinder
area of base = 15 cm^2 (approximately)
height = 10 cm

- b) a triangular prism
area of base = 30 cm^2
height = 3 cm

- d) a square prism
area of base = 120 cm^2
height = 40 cm

Unit 3, Practice 2

1. Find.

- a) 14% of 20 b) 10% of 30 c) 12% of 48 d) 28% of 90 e) 50% of 80
f) 80% of 80 g) 120% of 100 h) 120% of 200 i) 300% of 90 j) 150% of 400

2. A container has a capacity of 100 ml.
Jan used 20% of the liquid in the container.

- a) How much did she use?
b) How much remains?

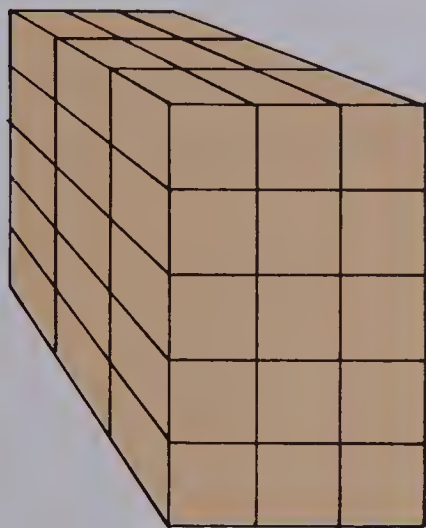
3. A team scored 200 points.

Gina scored 30% of the team's points.

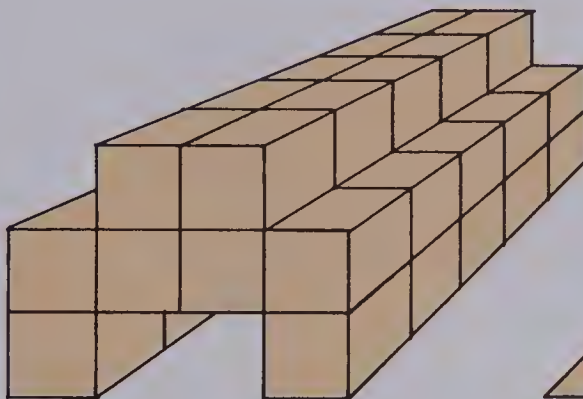
- a) How many points did she score?
b) What per cent of the points did the other members score?

4. Find the volume of each structure. Each small cube is 1 cm^3 .

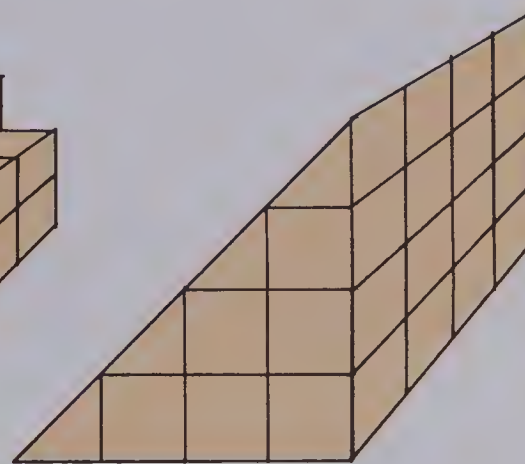
a)



b)



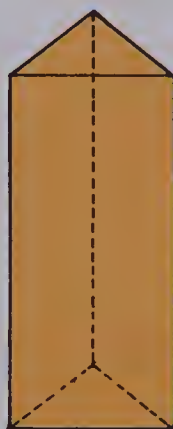
c)



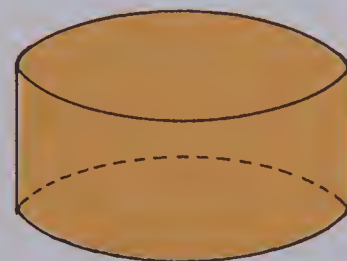
5. Calculate the volume in cubic centimetres (cm^3).



- a) Area of base is approximately 20 cm^2 .
Height is 15 cm.



- b) Area of base is 18.5 cm^2 .
Height is 20 cm.



- c) Area of base is approximately 40 m^2 .
Height is 10 m.

Unit 3, Check 3

Check your progress. The answers are on page 257.

1. Find the average temperature for the first 4 months of the year.

	Average temp. in Jan.	Average temp. in Feb.	Average temp. in Mar.	Average temp. in Apr.
a) Barbados	25°C	24.5°C	25°C	25.5°C
b) Panama City, Panama	26.2°C	26.7°C	27.3°C	27.8°C
c) Cape Town, S. Africa	21.1°C	21.1°C	25.5°C	18.3°C
d) Athens, Greece	8.9°C	9.5°C	11.6°C	15.6°C

2. Find the average of

a) 2, 6, 4 b) 21, 27, 23, 25 c) 3.2, 1.8, 1.5, 2, 2.5, 3.5, 3

3. What is the average score?

42, 47, 53, 58

4. What is the average amount?

\$1.84, \$2.00, \$2.84, \$3.00

5. Add.

a) 2.4	b) 19.4	c) 1.43	d) 0.36	e) 0.14	f) 14.36
36.7	246.8	0.67	0.04	7.26	0.24
14.6	100.4	2.04	0.91	5.55	9.77
<u>8.9</u>	<u>730.6</u>	<u>3.58</u>	<u>1.26</u>	<u>0.98</u>	<u>32.81</u>

6. Subtract.

a) 436.2	b) 32.46	c) 90.62	d) 3190.4	e) 77.77	f) 54.10
<u>196.0</u>	<u>8.99</u>	<u>81.37</u>	<u>1046.0</u>	<u>69.88</u>	<u>10.38</u>

7. Multiply.

a) 7.3	b) 58	c) 3.8	d) 7.40	e) 57.3	f) 81.7
<u>21</u>	<u>4.7</u>	<u>2.9</u>	<u>85</u>	<u>0.27</u>	<u>4.49</u>

8. An airplane kit costs \$3.49.
How much would 8 kits cost?

9. Jean has \$32.00. She spends \$19.83.
How much does she have left?

10. Student A ran 1.32 km; student B ran 1.56 km; student C ran 0.83 km; student D ran 0.75 km; and student E ran 1.05 km. What is the total distance run by the 5 students?

11. £1 (sterling) = \$1.74 (Canadian)
How much is £22.5 worth?

Unit 3, Practice 3

- Four NHL teams scored 354, 345, 280, and 213 goals respectively. What is the average number of goals scored?
- The recorded classroom temperatures for 3 d were: 20.5°C , 21°C , and 21.5°C . What was the average temperature?
- The lengths of sides of a polygon are: 12.4 cm, 18.5 cm, 15.7 cm, and 13.4 cm. What is the average length of a side of the polygon?

- Find the average number of
a) cars b) trucks c) buses and
d) bicycles that passed the school during the 5 d.

Room 38				
Traffic Survey 09:00 to 10:00				
Day	Cars	Trucks	Buses	Bicycles
Mon.	44	16	7	25
Tues.	36	13	6	11
Wed.	40	20	8	21
Thurs.	32	19	10	18
Fri.	48	12	9	15

- Add.

a) $\begin{array}{r} 4.35 \\ 16.30 \\ 24.61 \\ \hline 8.37 \end{array}$	b) $\begin{array}{r} 0.53 \\ 0.84 \\ 0.96 \\ \hline 0.72 \end{array}$	c) $\begin{array}{r} \$0.38 \\ 0.71 \\ 0.69 \\ \hline 5.08 \end{array}$	d) $\begin{array}{r} 1\,384.2 \\ 8\,721.3 \\ 634.2 \\ \hline 2\,064.5 \end{array}$	e) $\begin{array}{r} 14.3 \\ 97.5 \\ 88.8 \\ \hline 37.0 \end{array}$	f) $\begin{array}{r} \$\,1.84 \\ 19.36 \\ 22.00 \\ \hline 42.78 \end{array}$
---	---	---	--	---	--
- Subtract.

a) $\begin{array}{r} 487.2 \\ 160.3 \\ \hline \end{array}$	b) $\begin{array}{r} \$19.36 \\ 7.05 \\ \hline \end{array}$	c) $\begin{array}{r} 384.6 \\ 372.8 \\ \hline \end{array}$	d) $\begin{array}{r} 96.00 \\ 38.57 \\ \hline \end{array}$	e) $\begin{array}{r} \$80.00 \\ 39.07 \\ \hline \end{array}$	f) $\begin{array}{r} 357.1 \\ 169.8 \\ \hline \end{array}$
--	---	--	--	--	--
- Multiply.

a) $\begin{array}{r} 49 \\ 1.7 \\ \hline \end{array}$	b) $\begin{array}{r} 3.8 \\ 3.2 \\ \hline \end{array}$	c) $\begin{array}{r} \$1.32 \\ 45 \\ \hline \end{array}$	d) $\begin{array}{r} 17.4 \\ 3.26 \\ \hline \end{array}$	e) $\begin{array}{r} \$24.00 \\ 85 \\ \hline \end{array}$	f) $\begin{array}{r} 8.37 \\ 0.24 \\ \hline \end{array}$
---	--	--	--	---	--
- Solve.

a) $a = 0.32 + 6.4 + 9.3 + 18.2$	b) $d = 3.2 - 1.4$	c) $g = 4.32 \times 20$
d) $h = 1.36 + 81.6 + 9.23 + 5.5$	e) $e = 48.1 - 19.7$	f) $m = 92.4 \times 50$

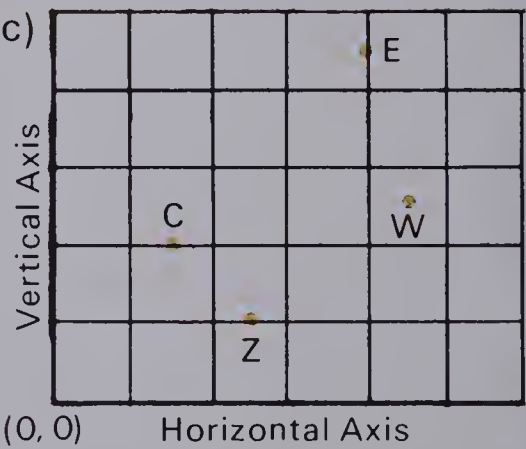
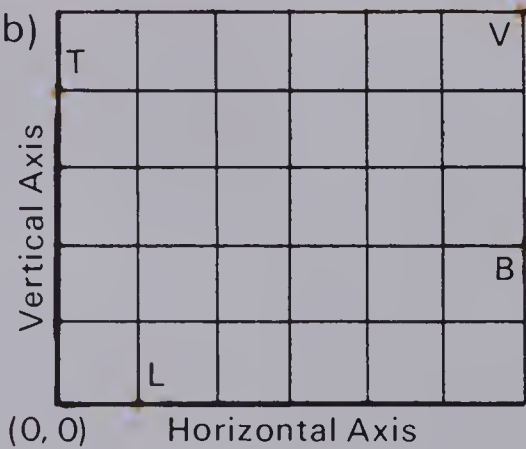
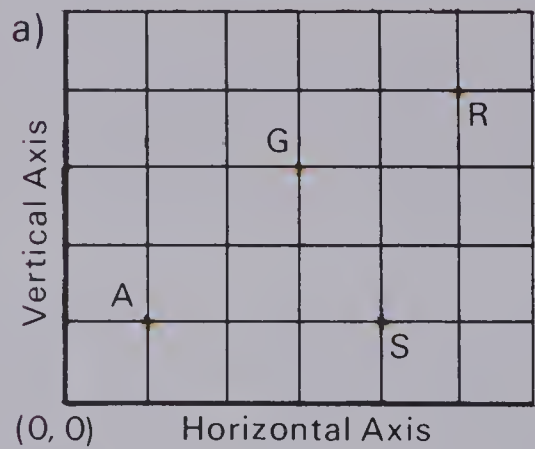
Unit 3, Check 4

Check your progress. The answers are on page 257.

1. Complete the chart.

	k	$k \times 0.1$	$k \div 0.01$	$k \times 10$	$k \div 0.1$	$k \times 0.01$	$k \div 10$
a)	5						
b)	37						
c)	246						
d)	4.6						
e)	81						
f)	0.3						
g)	652						
h)	7.3						

2. Give the ordered pair that names each point.



3. Divide.

- a) 798 by 21 b) 1080 by 15 c) 4320 by 36 d) 2394 by 42 e) 2465 by 29
f) 2146 by 37 g) 1363 by 47 h) 1080 by 18 i) 888 by 24 j) 1271 by 31

4. Divide. Express the quotient to the nearest tenth.

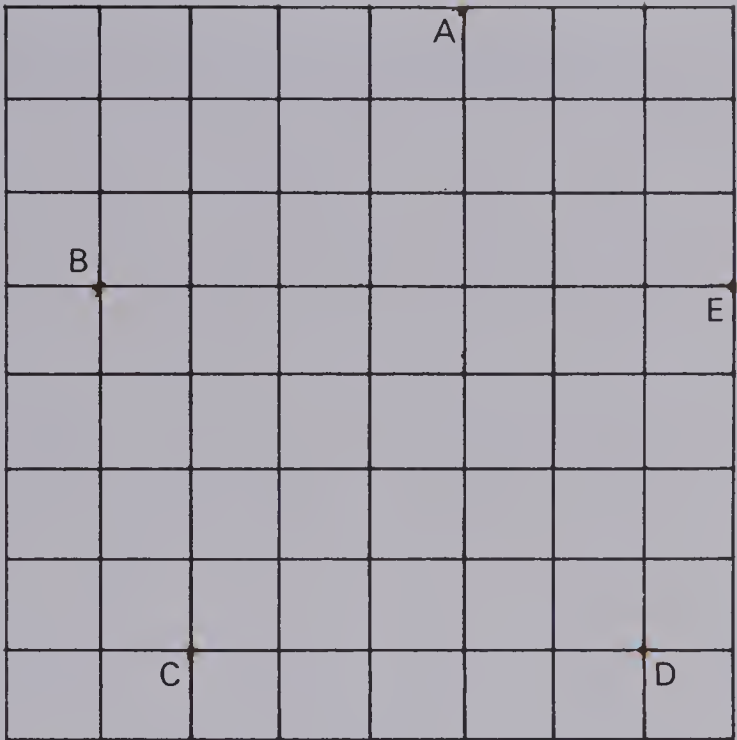
- a) 869 by 28 b) 990 by 19 c) 1225 by 14 d) 2062 by 21 e) 865 by 39
f) 1137 by 41 g) 399 by 12 h) 836 by 27 i) 639 by 46 j) 711 by 33

5. Divide. Express the quotient to the nearest tenth.

- a) 2.8 by 5 b) 3.9 by 8 c) 24.9 by 20 d) 4.31 by 9 e) 6.34 by 31
f) 64 by 0.5 g) 79 by 0.6 h) 74 by 1.6 i) 49 by 3.1 j) 81 by 4.9

Unit 3, Practice 4

1. a) Write the ordered pairs for the points A, B, C, D, and E.
b) If you joined A to C, A to D, B to D, B to E, and C to E, what new figure would you have made?



(0, 0)

2. Write the ordered pairs.
a) 1 to the right of B
b) 3 to the left of A
c) 2 above C
d) 3 below E

3. On a grid, show the horizontal axis, the vertical axis, and the origin. Locate the positions for (3, 1), (1, 3), (5, 3), and (3, 5).

Join all pairs of points with straight lines.
a) How many triangles did you form?
b) What type of triangles did you form?

4. Divide. Express the quotient to the nearest tenth.

- | | | | | |
|---------------|---------------|---------------|----------------|---------------|
| a) 37 by 5 | b) 48 by 3 | c) 19 by 7 | d) 52 by 6 | e) 92 by 8 |
| f) 31.4 by 11 | g) 356.2 by 8 | h) 47.1 by 29 | i) 740.0 by 50 | j) 517.3 by 6 |
| k) 15 by 0.6 | l) 28 by 0.4 | m) 81 by 0.3 | n) 77 by 0.7 | o) 47 by 0.2 |
| p) 5 by 0.05 | q) 9 by 0.03 | r) 6 by 0.15 | s) 4 by 0.45 | t) 12 by 0.12 |

5. Divide. Express the quotient to the nearest tenth.

- | | | | | | |
|------------------|------------------|-------------------|------------------|------------------|------------------|
| a) $\frac{2}{5}$ | b) $\frac{3}{4}$ | c) $\frac{5}{10}$ | d) $\frac{3}{2}$ | e) $\frac{8}{5}$ | f) $\frac{7}{8}$ |
|------------------|------------------|-------------------|------------------|------------------|------------------|

6. Express as a per cent.

- | | | | | | |
|------------------|------------------|------------------|------------------|------------------|------------------|
| a) $\frac{1}{2}$ | b) $\frac{3}{4}$ | c) $\frac{3}{8}$ | d) $\frac{3}{5}$ | e) $\frac{9}{8}$ | f) $\frac{9}{4}$ |
|------------------|------------------|------------------|------------------|------------------|------------------|

Answers / Unit 3, Check 1

1.

Pattern	Comparison	Ratio form	Fraction
a)	1 to 8	1:8	$\frac{1}{8}$
b)	4 to 5	4:5	$\frac{4}{5}$
c)	3 to 6	3:6	$\frac{3}{6}$
d)	5 to 4	5:4	$\frac{5}{4}$
e)	8 to 1	8:1	$\frac{8}{1}$

2.

	Ratio	Fraction	Equivalent least-term fraction
a)	5:10	$\frac{5}{10}$	$\frac{1}{2}$
b)	4:28	$\frac{4}{28}$	$\frac{1}{7}$
c)	9:21	$\frac{9}{21}$	$\frac{3}{7}$
d)	40:70	$\frac{40}{70}$	$\frac{4}{7}$
e)	8:24	$\frac{8}{24}$	$\frac{1}{3}$
f)	12:36	$\frac{12}{36}$	$\frac{1}{3}$

3. a) 2:10 b) 6:18 c) 1:3 d) 2:4 e) 15:25

4. a) 90 km b) 270 km c) 45 km d) 225 km e) 360 km

5. a) 40% b) 24% c) 0.8% d) 0.3% e) 130% f) 200%
g) 1.5% h) 3.2% i) 224% j) 107% k) 5% l) 12.5%

6. a) $\frac{28}{100}$ b) $\frac{90}{100}$ c) $\frac{8}{100}$ d) $\frac{0.4}{100}$ e) $\frac{110}{100}$ f) $\frac{2.5}{100}$ g) $\frac{100}{100}$

7 a) 28:100 b) 90:100 c) 8:100 d) 0.4:100 e) 110:100 f) 2.5:100 g) 100:100

Answers / Unit 3, Check 2

1. a) 60% b) 60% c) 48% d) 50% e) 50% f) 5%

2. a) $\frac{4}{10} = \frac{40}{100} = 40\%$ b) $\frac{8}{10} = \frac{80}{100} = 80\%$ c) $\frac{13}{10} = \frac{130}{100} = 130\%$ d) $\frac{5}{10} = \frac{50}{100} = 50\%$

e) $\frac{27}{10} = \frac{270}{100} = 270\%$ f) $\frac{21}{100} = 21\%$ g) $\frac{33}{100} = 33\%$ h) $\frac{125}{100} = 125\%$

i) $\frac{265}{100} = 265\%$ j) $\frac{5}{100} = 5\%$

3. a) 0.1 b) 0.25 c) 0.33 d) 0.05 e) 0.08 f) 1.10 g) 2.00 h) 0.85

4. a) 1.5 b) 4.8 c) 13.5 d) 24 e) 1.6 f) 31.5 g) 120 h) 200 i) 93.75 j) 52.8

5. a) 32 cm³ b) 2 cm³ c) 9 cm³ d) 22 cm³

6. a) 144 cm³ b) 90 cm³ c) 150 cm³ d) 4800 cm³

Answers / Unit 3, Check 3

1. a) 25°C b) 27°C c) 21.5°C d) 11.4°C
2. a) 4 b) 24 c) 2.5
3. 50
4. \$2.42
5. a) 62.6 b) 1097.2 c) 7.72 d) 2.57 e) 13.93 f) 57.18
6. a) 240.2 b) 23.47 c) 9.25 d) 2144.4 e) 7.89 f) 43.72
7. a) 153.3 b) 272.6 c) 11.02 d) 629.00 e) 15.471 f) 366.833
8. \$27.92 9. \$12.17 10. 5.51 km 11. \$39.15

Answers / Unit 3, Check 4

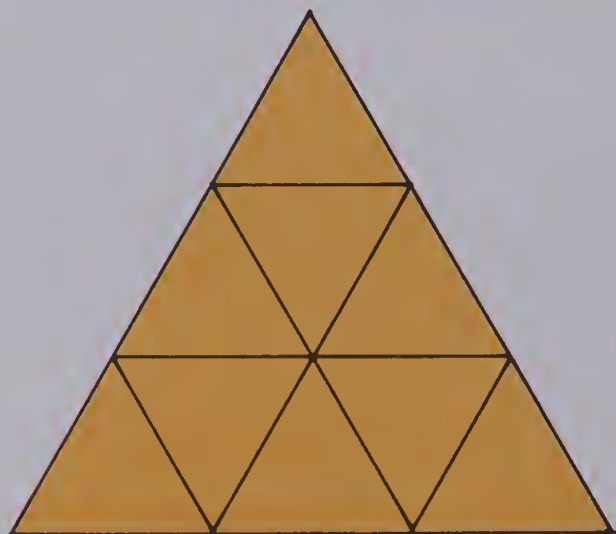
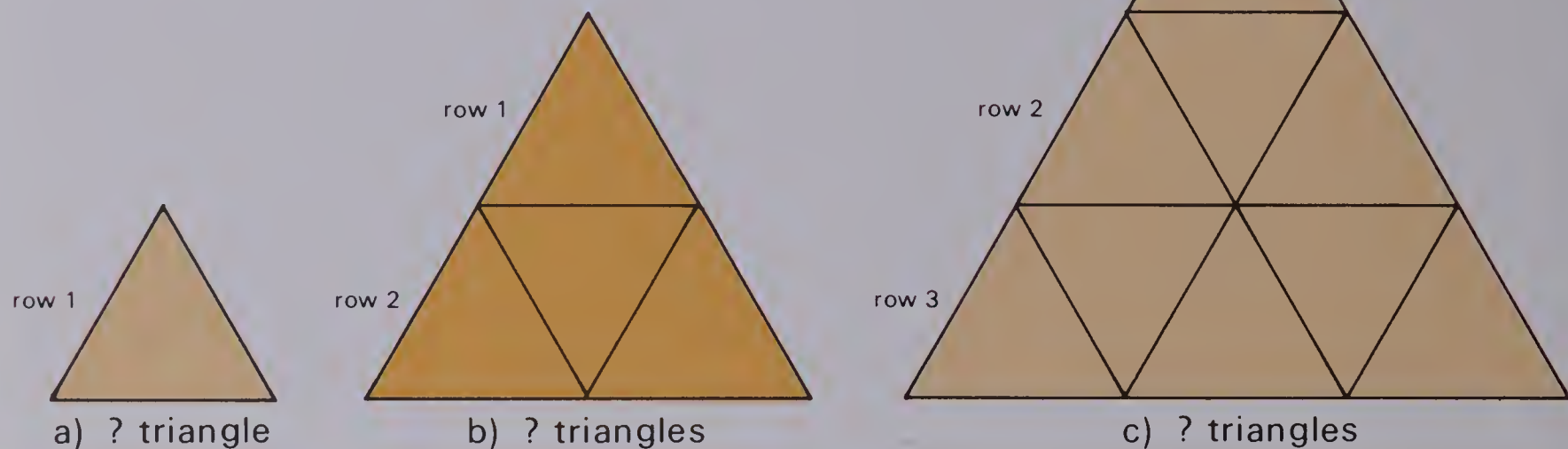
1.

	k	$k \times 0.1$	$k \div 0.01$	$k \times 10$	$k \div 0.1$	$k \times 0.01$	$k \div 10$
a)	5	0.5	500	50	50	0.05	0.5
b)	37	3.7	3700	370	370	0.37	3.7
c)	246	24.6	24 600	2460	2460	2.46	24.6
d)	4.6	0.46	460	46	46	0.046	0.46
e)	81	8.1	8100	810	810	0.81	8.1
f)	0.3	0.03	30	3	3	0.003	0.03
g)	652	65.2	65 200	6520	6520	6.52	65.2
h)	7.3	0.73	730	73	73	0.073	0.73
2. a) A (1, 1), G (3, 3), S (4, 1), R (5, 4)
 b) T (0, 4), L (1, 0), B (6, 2), V (6, 5)
 c) C (1.5, 2), Z (2.5, 1), E (4, 4.5), W (4.5, 2.5)
3. a) 38 b) 72 c) 120 d) 57 e) 85
 f) 58 g) 29 h) 60 i) 37 j) 41
4. a) 31.0 b) 52.1 c) 87.5 d) 98.2 e) 22.2
 f) 27.7 g) 33.2 h) 31.0 i) 13.9 j) 21.5
5. a) 0.6 b) 0.5 c) 1.2 d) 0.5 e) 0.2
 f) 128 g) 131.7 h) 46.2 i) 15.8 j) 16.5



Shapes and Patterns

How many triangles of different sizes can you see?
Record your answer.



Look for shapes other than triangles.
Trace and name each shape.

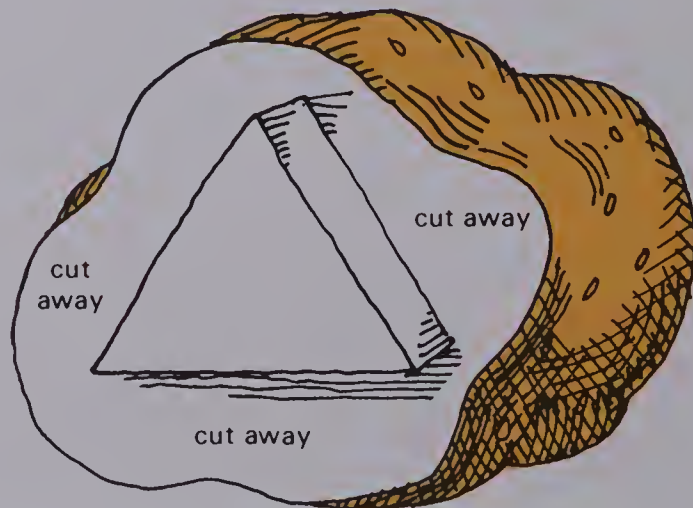
Trace this triangle.
Look for an interesting pattern.
Colour your pattern.

Trace this triangle. Add a fourth row.
Colour an interesting pattern.

Print your pattern.

Find out how to make a potato print.
Cut your pattern onto the potato.
See what new and interesting patterns
you can make by:

- covering a page
- making new shapes
- flips, slides, and turns.







EXPLORE

ORDER OF OPERATIONS

Consider the expression $25 + 15 \times 5$ in 2 ways.

For one way, the answer is 100.

For another way, the answer is 200.

How do you arrive at the result 100?

How do you arrive at the result 200?

If we used the same expression to find the total cost of 1 chocolate bar (25¢) and 5 ice cream cones (15¢ each), there is no doubt of the correct result.

$$\begin{aligned}\text{Cost in cents} &= 25 + 15 \times 5 \\ &= 25 + 75 \\ &= 100\end{aligned}$$

The multiplication must be completed before the addition.

To avoid confusion, there is an order of performing operations within expressions.

I Complete multiplications and divisions first, in the order in which they occur from left to right.

II Then complete additions and subtractions, in the order in which they occur from left to right.

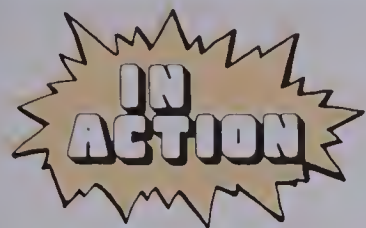
$$\begin{aligned}6 \times 3 + 7 &= 18 + 7 \\ &= 25\end{aligned}$$

$$\begin{aligned}7 + 6 \times 3 &= 7 + 18 \\ &= 25\end{aligned}$$

$$\begin{aligned}35 \div 5 - 4 &= 7 - 4 \\ &= 3\end{aligned}$$

$$\begin{aligned}39 - 35 \div 5 &= 39 - 7 \\ &= 32\end{aligned}$$

$$\begin{aligned}6 \times 7 - 9 \times 8 \div 6 &= 42 - 72 \div 6 \\ &= 42 - 12 \\ &= 30\end{aligned}$$



1. Complete.

$$20 - 4 \times 5 \div 10 + 18 \div 3 \times 2 = ?$$

Did you obtain 30 for your result?

Check your work with the solution at the bottom of the page.

2. Find.

a) $6 \times 3 \div 2$

d) $3 + 2 \times 7$

g) $4 + 4 \div 2 \times 5$

j) $12 - 8 \div 4$

b) $7 - 12 \div 3$

e) $8 \div 2 + 9$

h) $4 + 4 \div 4 \times 4$

k) $29 - 2 \times 4$

c) $6 + 3 - 4$

f) $2 \times 14 - 7$

i) $7 + 2 + 6 \times 3$

l) $90 \div 30 \div 3$

3. Find.

a) $16 + 18 \div 6 \div 3$

d) $8 + 2 \times 6 \div 4$

g) $21 \div 3 + 1 - 2$

b) $15 \div 5 \times 4 \div 6$

e) $48 \div 6 + 21 \div 7$

h) $9 \times 8 \div 12 + 8$

c) $7 \times 8 \div 2 \div 7$

f) $7 + 3 \times 5 + 8$

i) $9 + 12 - 3 + 7 - 6$

4. Find.

a) $6 \times 7 \div 2 + 14 \div 2$

d) $4 \times 8 + 6 \times 7 + 3 \times 9$

f) $9 \times 9 - 9 \times 3 + 7 \times 5$

h) $8 + 9 \times 10 \div 2 \times 5 - 2$

b) $7 \times 4 \div 2 \times 3 \times 5$

e) $6 \times 7 + 5 \times 6 \div 3 \times 4$

g) $7 \times 7 - 35 \div 5 + 4 \times 3 \times 2$

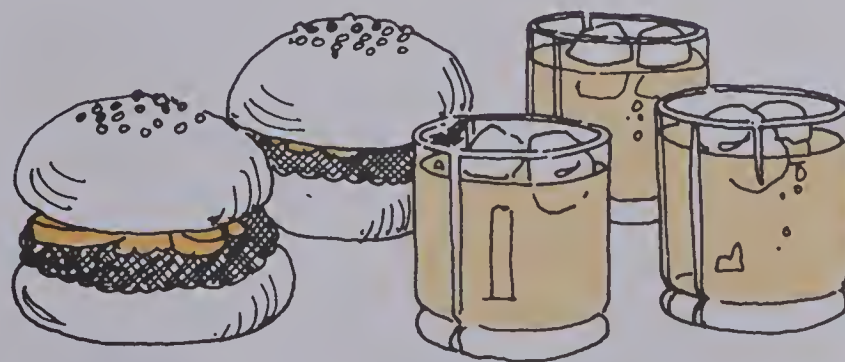
i) $3 \times 7 + 3 \times 4 - 2 \times 4 - 2 \times 3$

c) $9 \times 6 \div 2 + 4 \times 8$

5. What is the total cost of 2 hamburgers at 95¢ each and 3 glasses of orange juice at 25¢ each?

a) Write an expression for the cost.

b) Calculate the cost.



6. Write an expression to find the number of students playing in different areas of the park.

18 students were playing in each of 3 areas;

27 students were playing in each of 2 areas;

and 15 students were playing in each of 2 areas.

Find the total number of students playing in the park.

Solution for Question 1

$$\begin{aligned} & 20 - 20 \div 10 + 6 \times 2 \\ &= 20 - 2 + 12 \\ &= 30 \end{aligned}$$



Order of Operations/Brackets

If brackets appear in an expression,
they indicate the operation to be performed first.

$$\begin{aligned}(7 + 3) \times 4 &= 10 \times 4 \\ &= 40\end{aligned}$$

$$\begin{aligned}18 \div (12 - 3) &= 18 \div 9 \\ &= 2\end{aligned}$$

After completing the operations in brackets, perform the
remaining operations according to the order rule.

If several operations appear within the brackets,
complete these according to the order rule.

$$\begin{aligned}16 - 30 \div 3 \div (3 + 8 \div 4) \\ &= 16 - 10 \div (3 + 2) \\ &= 16 - 10 \div 5 \\ &= 16 - 2 \\ &= 14\end{aligned}$$



1. Find.

a) $6 \div (2 + 4)$

b) $18 \div (2 \times 3)$

c) $5 + 3 \times (6 \div 2)$

d) $(2 \times 3) - (3 \times 2)$

e) $7 \times (3 + 5) + 9$

f) $10 - (5 + 2) - 3$

g) $7 - (4 + 3) + 9$

h) $81 \div (3 \times 3 \times 3)$

2. Find.

a) $9 \times (16 \div 2 \div 4)$

b) $34 - (20 + 8 \div 2)$

c) $5 \times 3 + (4 + 6) \div 2$

d) $17 - (4 + 6) \div 2 + 6$

e) $16 - (6 + 3) - 8 \div 2$

f) $21 - (5 + 3) \div (1 + 7)$

g) $(32 \div 8 + 5 \times 2) + (4 \times 5 \div 10 + 2)$

h) $23 - (6 + 8 \div 2) - 4$

i) $48 \div (21 + 4 - 9)$

3. Find.

a) $(5 + 3) \times (2 + 7) \div (5 - 1)$

b) $(8 + 3) + (4 + 17) \div (2 \times 5 - 3)$

c) $24 + 72 \div 9 - (5 + 2 \times 8 \div 4)$

d) $31 + (3 \times 10 \div 5) \times (29 - 3 \times 8)$

e) $7 \times 6 - (23 - 4 \times 5 - 3)$

f) $56 \div 7 - (14 - 28 \div 4) \times (31 - 5 \times 6)$



Word Problems

1. Leslie has read 45 pages of a 187-page book. How many pages has he left to read?

3. What number is 9 less than the difference between 32 and 8?



6. Larry is $\frac{1}{2}$ as old as Lorne. Lorne was 10 years old 2 a ago. How old is Larry?

8. Chicken costs \$2.10/kg. How much would a 4 kg chicken cost?

10. Pete is 9 years old, Donna is 4 a older than Pete, and Bob is 2 a older than Donna. How much older is Bob than Pete?

12. Mrs. Chang takes 34 min to travel to work. Miss Lawrence takes 1 h 20 min. If they both leave their homes at the same time, how many minutes later than Mrs. Chang does Miss Lawrence arrive at work?

2. What number is 15 less than the sum of 20 and 4?

4. What number added to the sum of 4 and 9 will give a sum of 23?

5. When Jerry first bought his route, he delivered 63 newspapers. In a 3-month period, he lost 4 customers and gained 6 new customers. How many papers does he deliver now?

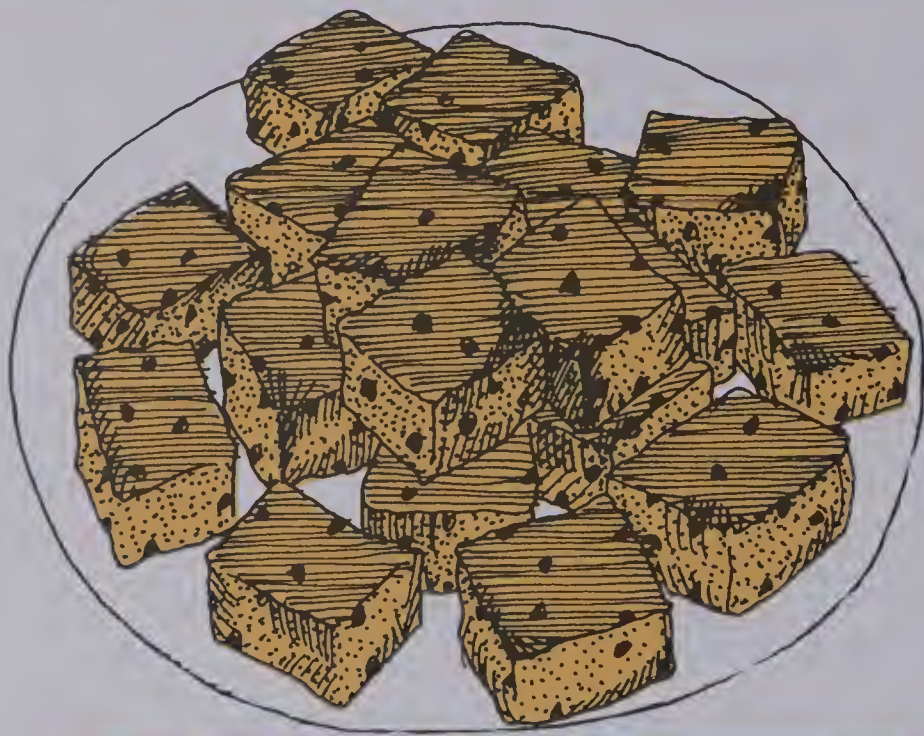
7. Sue lives 1.75 km from school. Sarah lives 1.3 km from school. If they both go home for lunch, how far does each walk in 1 d?

9. After buying 3 apples at 19¢ each, I had 43¢ left. How much money did I start with?

11. A swimming pool is 12 m long. How far will a swimmer travel if he swims 15 lengths?



Word Problems



CHOCOLATE BROWNIES

Sift together 175 ml cake flour
 100 ml cocoa
 1 ml salt

Cream together 125 ml shortening
 225 ml granulated
 sugar

2 eggs
5 ml vanilla

Beat until light and fluffy.

Stir dry ingredients into creamed mixture
together with 50 ml water

125 ml chopped nuts.

Turn into a greased 20 cm by 20 cm
by 5 cm pan.

Bake for 25-30 min.

Cut into bars while still warm.

Makes 24 bars.

1. How many millilitres more of
 - a) sugar than flour
 - b) flour than cocoa are required?
2. How many millilitres less of
 - a) flour than sugar
 - b) nuts than sugar are required?
3. Write the amount of each ingredient needed if you tripled the recipe.
4. Write down the quantity of each ingredient needed to make $\frac{1}{2}$ the amount given by this recipe.
5. Draw sketches to illustrate the different ways you could cut the brownies into 24 equal bars. Which way would you cut the brownies?
6. What is the perimeter of the pan?
7. What is the area of the bottom of the pan?
8. The mixture rises to a height of 3 cm.
 - a) What is the volume of the pan?
 - b) What is the volume of the brownies?
 - c) What is the unused volume of the pan?
 - d) What is the volume of 1 brownie?

EXPLORE

FRACTIONS/Forming Equivalent Fractions

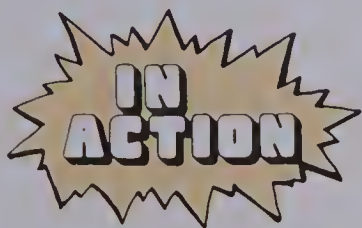
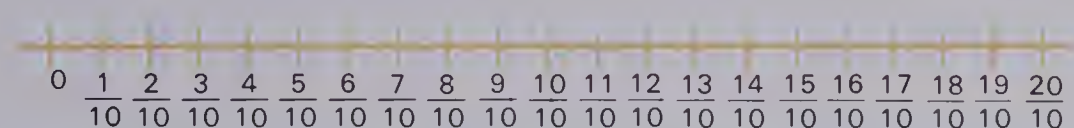
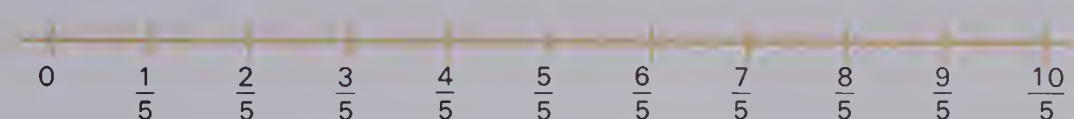
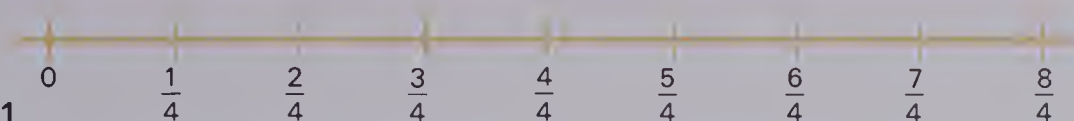
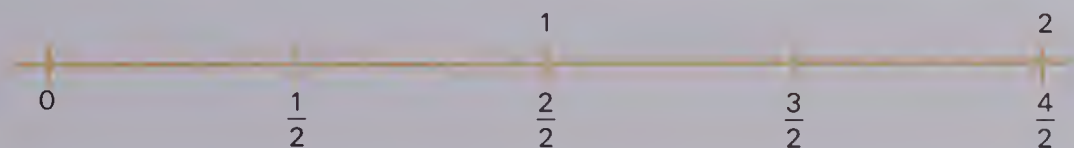
Equivalent fractions name the same point

on a fractional number line.

Into how many equal parts is the unit 0 to 1 divided for each fractional number line?

A unit fraction has the numerator 1.

What is the unit fraction for each number line?



1. Use the chart to list equivalent fractions.

a) $\frac{1}{2} = \frac{?}{4} = \frac{?}{10}$

b) $\frac{1}{5} = \frac{?}{10}$

c) $\frac{2}{2} = \frac{?}{4} = \frac{?}{5} = \frac{?}{10}$

d) $\frac{3}{2} = \frac{?}{4}$

e) $\frac{4}{2} = \frac{?}{4} = \frac{?}{5} = \frac{?}{10}$

f) $\frac{1}{5} = \frac{?}{?}$

g) $\frac{3}{5} = \frac{?}{?}$

h) $\frac{7}{5} = \frac{?}{10}$

2. Form equivalent fractions by multiplying the numerator and denominator by the same number.

a) $\frac{1}{2} = \frac{1 \times 2}{2 \times 2}$
 $= \frac{2}{?}$

b) $\frac{1}{2} = \frac{1 \times 5}{2 \times ?}$
 $= ?$

c) $\frac{1}{2} = \frac{1 \times ?}{2 \times 10}$
 $= ?$

d) $\frac{1}{2} = \frac{1 \times 50}{2 \times ?}$
 $= ?$

e) $\frac{1}{5} = \frac{1 \times 2}{5 \times 2}$
 $= ?$

f) $\frac{4}{5} = \frac{4 \times 2}{5 \times ?}$
 $= ?$

g) $\frac{1}{10} = \frac{1 \times 10}{10 \times ?}$
 $= ?$

h) $\frac{1}{5} = \frac{1 \times 20}{5 \times ?}$
 $= ?$



Adding and Subtracting Fractions/Like Denominators

ADDITION



$$\frac{4}{5} + \frac{2}{5} = \frac{6}{5}$$

SUBTRACTION



$$\frac{6}{5} - \frac{2}{5} = \frac{4}{5}$$



1. Add. Reduce to least terms.

- a) $\frac{1}{2} + \frac{2}{2}$ b) $\frac{3}{5} + \frac{1}{5}$ c) $\frac{3}{4} + \frac{4}{4}$ d) $\frac{5}{4} + \frac{3}{4}$ e) $\frac{3}{10} + \frac{7}{10}$
 f) $\frac{6}{10} + \frac{3}{10}$ g) $\frac{7}{100} + \frac{24}{100}$ h) $\frac{2}{5} + \frac{4}{5}$ i) $\frac{3}{4} + \frac{2}{4}$ j) $\frac{2}{10} + \frac{3}{10}$

2. Subtract. Reduce to least terms.

- a) $\frac{4}{2} - \frac{3}{2}$ b) $\frac{75}{100} - \frac{25}{100}$ c) $\frac{2}{4} - \frac{1}{4}$ d) $\frac{9}{10} - \frac{5}{10}$ e) $\frac{3}{5} - \frac{2}{5}$
 f) $\frac{7}{4} - \frac{3}{4}$ g) $\frac{8}{5} - \frac{4}{5}$ h) $\frac{4}{10} - \frac{2}{10}$ i) $\frac{8}{5} - \frac{6}{5}$ j) $\frac{18}{10} - \frac{6}{10}$

3. Solve.

- a) $e = \frac{1}{4} + \frac{3}{4}$ b) $p = \frac{9}{10} - \frac{7}{10}$ c) $m = \frac{1}{5} + \frac{4}{5}$ d) $j = \frac{5}{5} - \frac{1}{5}$
 e) $\frac{5}{5} + k = \frac{7}{5}$ f) $\frac{5}{2} - h = \frac{3}{2}$ g) $n + \frac{5}{10} = \frac{13}{10}$ h) $r - \frac{3}{5} = \frac{5}{5}$

4. Complete.

$a + b$			$\frac{109}{100}$				$\frac{12}{10}$	$\frac{9}{10}$		
a	$\frac{3}{5}$	$\frac{7}{4}$	$\frac{77}{100}$		$\frac{3}{2}$		$\frac{7}{10}$		$\frac{3}{4}$	$\frac{6}{5}$
b	$\frac{2}{5}$	$\frac{5}{4}$		$\frac{3}{10}$	$\frac{1}{2}$	$\frac{25}{100}$		$\frac{3}{10}$		
$a - b$				$\frac{6}{10}$		$\frac{50}{100}$			$\frac{1}{4}$	$\frac{3}{5}$



Adding and Subtracting Fractions/Unlike Denominators

ADDITION

$\frac{4}{10} + \frac{1}{2} = ?$

$\frac{4}{10} + \frac{5}{10} = ?$

Think

$\times ?$

$=$

$\times 5$

$\frac{1}{2}$

$\frac{?}{10}$

SUBTRACTION

$\frac{6}{5} - \frac{3}{10} = ?$

$\frac{12}{10} - \frac{3}{10} = ?$

Think

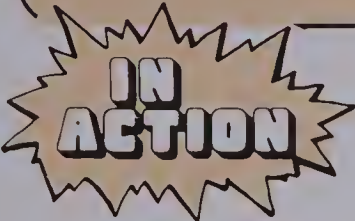
$\times ?$

$=$

$\times 2$

$\frac{6}{5}$

$\frac{?}{10}$



1. Write 2 equivalent fractions for each of the following.

- a) $\frac{1}{2}$ b) $\frac{2}{5}$ c) $\frac{6}{10}$ d) $\frac{20}{100}$ e) $\frac{6}{4}$ f) $\frac{5}{2}$ g) $\frac{2}{10}$ h) $\frac{50}{100}$

2. Add. Reduce to least terms.

- a) $\frac{1}{2} + \frac{3}{4}$ b) $\frac{3}{2} + \frac{10}{100}$ c) $\frac{4}{10} + \frac{3}{5}$ d) $\frac{5}{4} + \frac{3}{2}$ e) $\frac{1}{5} + \frac{8}{10}$
f) $\frac{3}{10} + \frac{7}{5}$ g) $\frac{8}{10} + \frac{1}{2}$ h) $\frac{2}{5} + \frac{10}{100}$ i) $\frac{4}{5} + \frac{1}{10}$ j) $\frac{75}{100} + \frac{1}{4}$

3. Subtract. Reduce to least terms.

- a) $\frac{3}{2} - \frac{3}{4}$ b) $\frac{2}{5} - \frac{3}{10}$ c) $\frac{9}{10} - \frac{1}{2}$ d) $\frac{5}{4} - \frac{1}{2}$ e) $\frac{1}{4} - \frac{20}{100}$
f) $\frac{4}{4} - \frac{1}{2}$ g) $\frac{10}{4} - \frac{2}{2}$ h) $\frac{3}{5} - \frac{15}{100}$ i) $\frac{13}{10} - \frac{4}{5}$ j) $\frac{1}{2} - \frac{25}{100}$

4. Complete.

$a + b$										
a	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{11}{10}$	$\frac{5}{2}$	$\frac{7}{2}$	$\frac{15}{10}$	$\frac{7}{4}$	$\frac{75}{100}$	$\frac{7}{5}$
b	$\frac{7}{10}$	$\frac{50}{100}$	$\frac{1}{5}$	$\frac{2}{2}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{5}{5}$	$\frac{3}{2}$	$\frac{3}{5}$	$\frac{3}{10}$
$a - b$										



Adding and Subtracting Fractions/Unlike Denominators

ADDITION

$$\frac{4}{5} + \frac{1}{2} = \frac{8}{10} + \frac{5}{10} \\ = \frac{13}{10}$$

Think

$$\frac{4}{5} = \frac{4 \times 2}{5 \times 2} \text{ or } \frac{8}{10}$$
$$\frac{1}{2} = \frac{1 \times 5}{2 \times 5} \text{ or } \frac{5}{10}$$

Why do we change each fraction to tenths?

SUBTRACTION

$$\frac{9}{5} - \frac{3}{2} = \frac{18}{10} - \frac{15}{10} \\ = \frac{3}{10}$$

Think

$$\frac{9}{5} = \frac{9 \times 2}{5 \times 2} \text{ or } \frac{18}{10}$$
$$\frac{3}{2} = \frac{3 \times 5}{2 \times 5} \text{ or } \frac{15}{10}$$


1. Find.

- a) $\frac{1}{5} + \frac{3}{2}$
- b) $\frac{3}{4} - \frac{1}{2}$
- c) $\frac{1}{4} + \frac{3}{2}$
- d) $\frac{7}{4} - \frac{1}{2}$
- e) $\frac{1}{5} + \frac{1}{2}$
- f) $\frac{3}{5} + \frac{5}{10}$
- g) $\frac{5}{4} - \frac{3}{4}$
- h) $\frac{2}{5} + \frac{3}{10}$
- i) $\frac{3}{10} - \frac{1}{5}$
- j) $\frac{3}{2} + \frac{1}{5}$

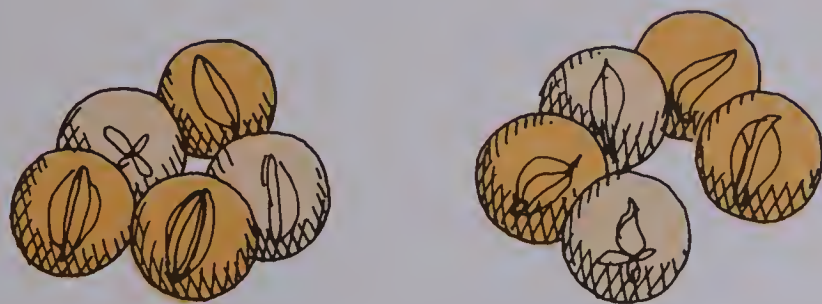
2. Complete.

$a + b$							
a	$\frac{3}{2}$	$\frac{7}{10}$	$\frac{6}{5}$	$\frac{9}{10}$	$\frac{3}{4}$	$\frac{7}{4}$	$\frac{5}{5}$
b	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{2}$	$\frac{1}{2}$
$a - b$							



A Fraction of a Whole Number

What is $\frac{1}{2}$ of 10?



$$\frac{1}{2} \text{ of } 10 = 5$$

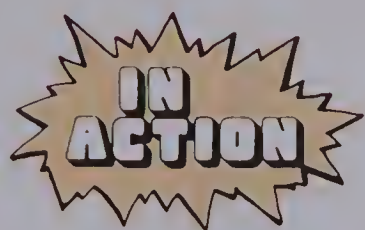
$$\begin{aligned} \frac{1}{2} \times 10 &= \frac{1 \times 10}{2} \\ &= \frac{10}{2} \\ &= 5 \end{aligned}$$

What is $\frac{1}{4}$ of 24?



$$\frac{1}{4} \text{ of } 24 = 6$$

$$\begin{aligned} \frac{1}{4} \times 24 &= \frac{1 \times 24}{4} \\ &= \frac{24}{4} \\ &= ? \end{aligned}$$



1. Complete.

$$\begin{aligned} \text{a) } \frac{1}{2} \text{ of } 6 &= \frac{1}{2} \times 6 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{1}{4} \text{ of } 8 &= \frac{1}{4} \times 8 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{1}{5} \text{ of } 20 &= \frac{1}{5} \times 20 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{2}{5} \text{ of } 15 &= \frac{2}{5} \times 15 \\ &= \frac{2 \times 15}{5} \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{3}{4} \text{ of } 16 &= \frac{3}{4} \times 16 \\ &= \frac{3 \times 16}{4} \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{4}{5} \text{ of } 10 &= \frac{4}{5} \times 10 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{g) } \frac{5}{4} \text{ of } 20 &= \frac{5}{4} \times 20 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{h) } \frac{7}{10} \text{ of } 50 &= \frac{7}{10} \times 50 \\ &= ? \\ &= ? \end{aligned}$$

$$\begin{aligned} \text{i) } \frac{3}{100} \text{ of } 100 &= \frac{3}{100} \times 100 \\ &= ? \\ &= ? \end{aligned}$$



2. Find.

a) $\frac{1}{2}$ of 8

b) $\frac{3}{4}$ of 4

c) $\frac{2}{5}$ of 15

d) $\frac{4}{5}$ of 100

e) $\frac{5}{4}$ of 24

f) $\frac{2}{10}$ of 50

g) $\frac{1}{4}$ of 20

h) $\frac{7}{4}$ of 12

i) $\frac{2}{5}$ of 15

j) $\frac{1}{5}$ of 35

k) $\frac{5}{2}$ of 24

l) $\frac{5}{10}$ of 100

3. Find.

a) $\frac{4}{5} \times 60$

b) $\frac{3}{4} \times 4$

c) $\frac{3}{2} \times 2$

d) $\frac{9}{10} \times 90$

e) $\frac{1}{4} \times 2$

f) $\frac{3}{10} \times 5$

g) $\frac{3}{2} \times 10$

h) $\frac{5}{4} \times 2$



4. There are 24 students in Mrs. Williamson's class.

$\frac{1}{4}$ of the children are wearing sweaters. $\frac{1}{2}$ of the children are girls.

$\frac{1}{3}$ of the children are bussed to school. $\frac{3}{4}$ of the children have a brother or sister.

$\frac{1}{4}$ of the children walk to school.

How many of the children

a) have a brother or sister

b) are wearing sweaters

c) are bussed to school

d) are boys

e) walk to school?



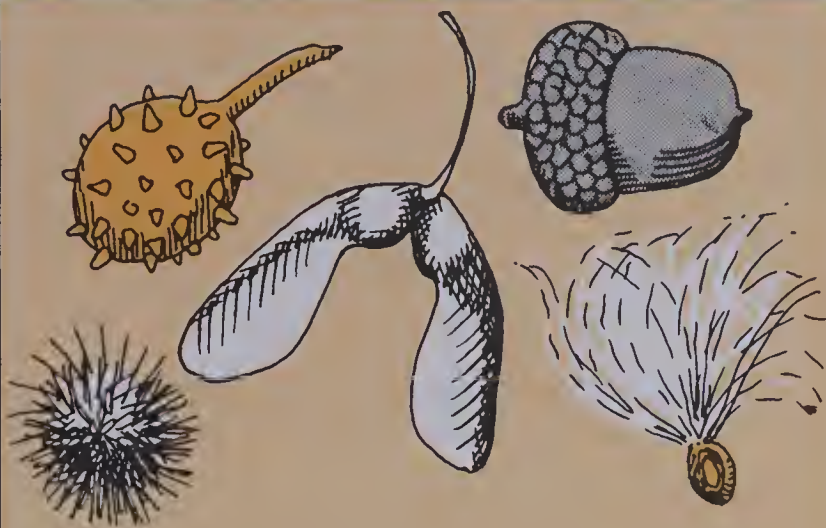
A Part of a Group of Objects



4 leaves

3 of the leaves are simple

$\frac{3}{4}$ of the leaves are simple



5 seeds

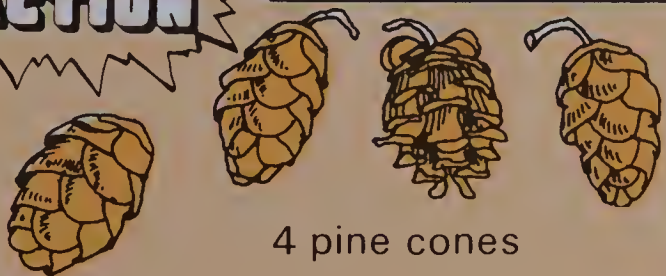
2 of the seeds are carried by the wind

$\frac{2}{5}$ of the seeds are carried by the wind

**IN
ACTION**

1. Complete.

a)



4 pine cones

1 of the cones is open.

$\frac{1}{4}$ of the cones are open.

b)

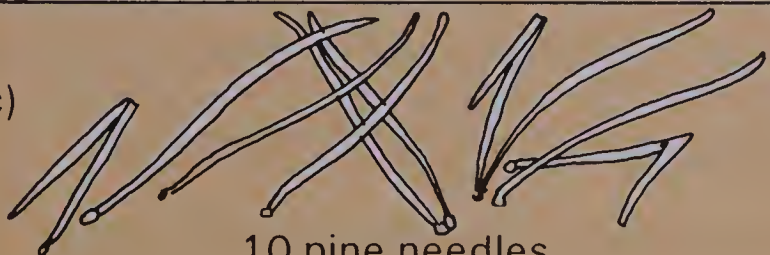


5 acorns

? of the acorns have caps.

$\frac{3}{5}$ of the acorns have caps.

c)



10 pine needles

? of the pine needles are broken

$\frac{4}{10}$ of the pine needles are broken

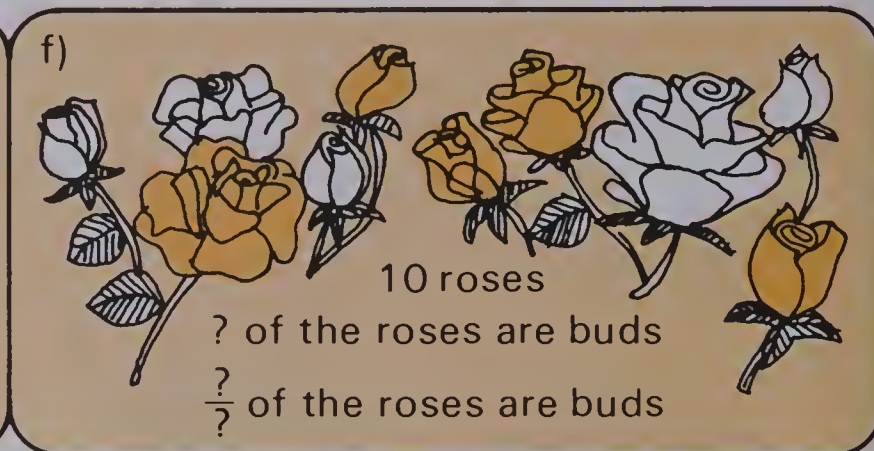
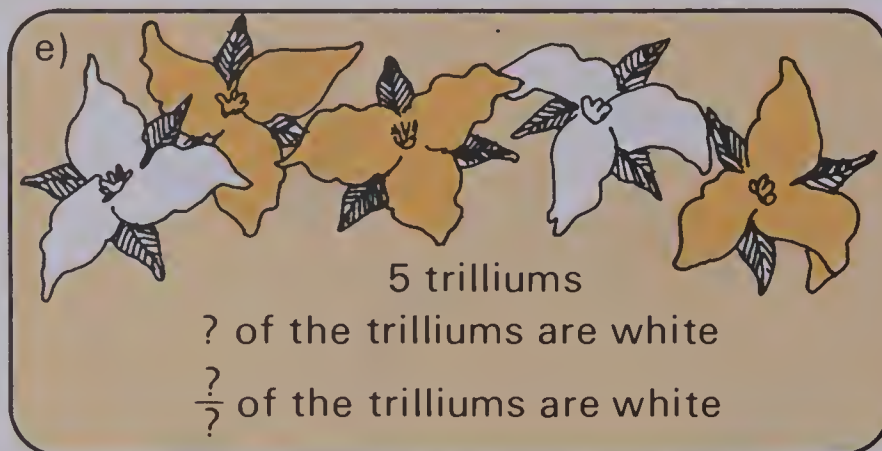
d)



4 chestnuts

? of the chestnuts is broken

$\frac{1}{4}$ of the chestnuts are broken



2. What is the fraction?

- a) 10 bicycles, 5 have banana seats
- c) 100 bulbs, 40 are tulips
- e) 5 insects, 3 are ants
- g) 5 numbers, 1 is composite
- i) 4 novels, 3 are science fiction

- b) 5 numbers, 4 are even
- d) 4 mammals, 1 is a whale
- f) 2 Territories, 1 is the Yukon
- h) 10 fruit, 7 are tomatoes
- j) 100 books, 75 are *mathways*

3. Europe	Canada	South America	Saskatoon	Alberta
Ottawa	Brazil	Australia	Winnipeg	Africa

What fraction of these places

- a) are continents
- c) are countries
- e) have 6 letters in their names
- b) are cities in Canada
- d) are Canadian provinces
- f) are in the Northern Hemisphere?

4. What fraction of these numbers

- a) are whole numbers (0 is a whole number)
- b) are counting numbers (0 is not a counting number)
- c) are even numbers
- d) are odd numbers
- e) are prime numbers
- f) are composite numbers
- g) are square numbers
- h) are factors of 24
- i) are multiples of 3?

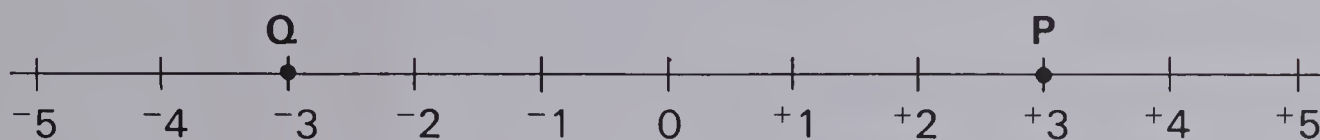
0 4 9 7 3

1 5 6 2 8

EXPLORE

INTEGERS

When we name points to the right and to the left of 0 on a number line, we use **integers**.



P is 3 units to the **right** of 0. We name its position

$+3$ — “**positive three**”.

Q is 3 units to the **left** of 0. We name its position

-3 — “**negative three**”.

IN ACTION

1. Think about the number line to complete the chart.

Name of point	Position	Integer
A	2 units right of 0	
B	4 units left of 0	
C	6 units left of 0	
D		$+8$
E		-7
F		-4
G	9 units right of 0	
H	7 units right of 0	

2. Draw a number line. Mark 0, the zero position.
Mark a point 1 cm to the right of 0. Name it $+1$.
Mark a point 1 cm to the left of 0. Name it -1 .
Show the positions for the integers from -10 to $+10$.

Using Integers

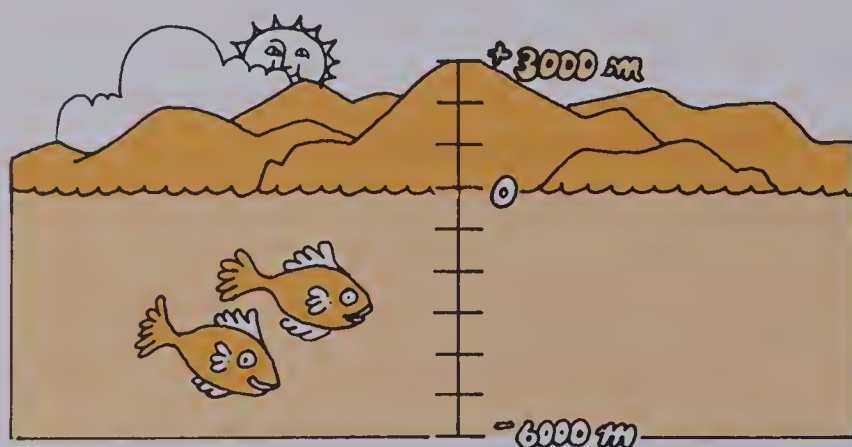
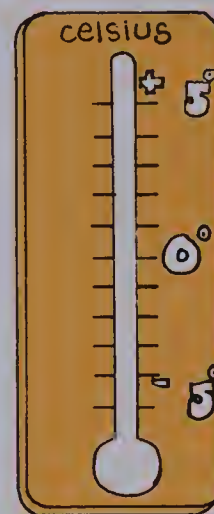
An integer tells a **magnitude** and a **direction**.

$+5$ is 5 units to the right of 0 on a number line.

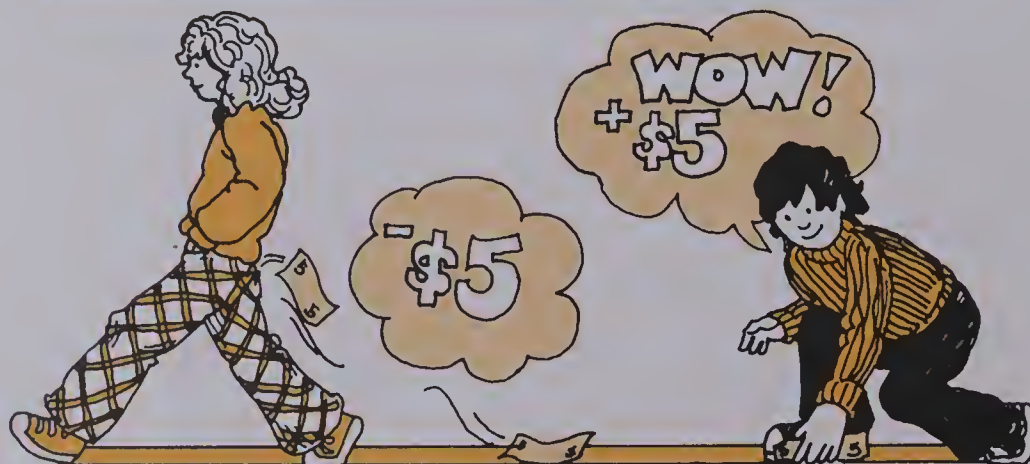
-5 is 5 units to the left of 0 on a number line.

$+5$ and -5 are **opposites**.

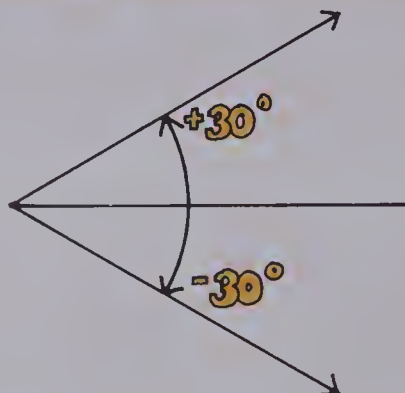
If we use positive integers for temperatures above 0°C , we use negative integers for temperatures below 0°C .



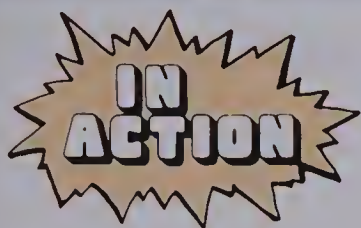
If we use positive integers for heights above sea level, we use negative integers for depths below sea level.
What number do you use to indicate sea level?



If we use positive integers to indicate gains, we use negative integers to indicate losses.
 $+\$5$ $-\$5$



If we use positive integers to indicate counter-clockwise rotations, we use negative integers to indicate clockwise rotations.



- Draw a number line and show the integers -10 to $+10$.
Use arcs to join pairs of opposite integers.
a) $+1, -1$ b) $+4, -4$ c) $+6, -6$ d) $+7, -7$ e) $+9, -9$ f) $+10, -10$
- What is the opposite?
a) $+6$ b) $+12$ c) -3 d) -1 e) -4 f) -8 g) $+10$ h) -13
i) $+1$ j) -10 k) $+50$ l) -75 m) $+100$ n) -1000 o) -200 p) -4000
- Complete.

Magnitude and direction	Integer	Magnitude and opposite direction	Opposite
12 km right	$+12$	12 km left	
22°C		-22°C	
8 km below sea level		8 km above sea level	
a gain of \$20	$+20$		
a rotation of 40° clockwise			$+40$
a loss of \$10			
-9°C			
10 cm up	$+10$		
20 cm down			
a rotation of 50° counter-clockwise			

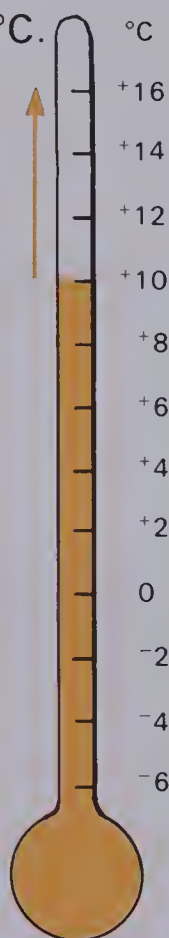


Combining Integers

The temperature at 08:00 was $+10^{\circ}\text{C}$.
At 12:00 it was $+16^{\circ}\text{C}$.

The arrow shows the magnitude and direction of the change in temperature.

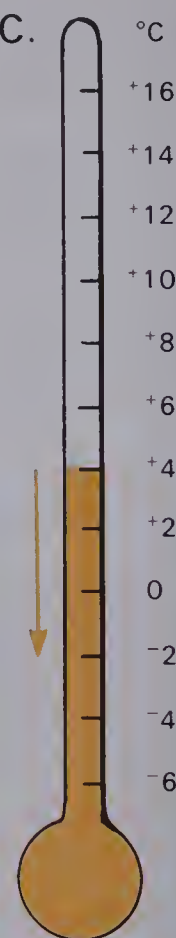
The **change** is represented by $+6$.



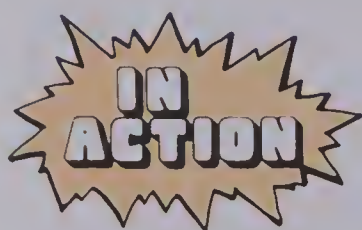
$+10$ and $+6$ is $+16$

The temperature at 18:00 was $+4^{\circ}\text{C}$.
At 06:00 the next day it was -2°C .
The arrow shows the magnitude and direction of the change in temperature.

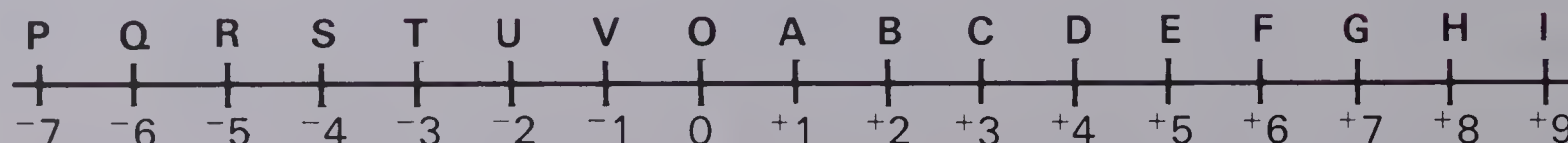
The **change** is represented by -6 .



$+4$ and 6 is -2



Which integer tells the change on the number line?



Remember A move to the right is positive.

A move to the left is negative.

From

a) O to D

b) O to S

c) A to C

d) B to F

e) E to I

f) P to S

g) R to U

h) T to O

i) V to A

j) S to D

k) B to V

l) H to O

m) F to R

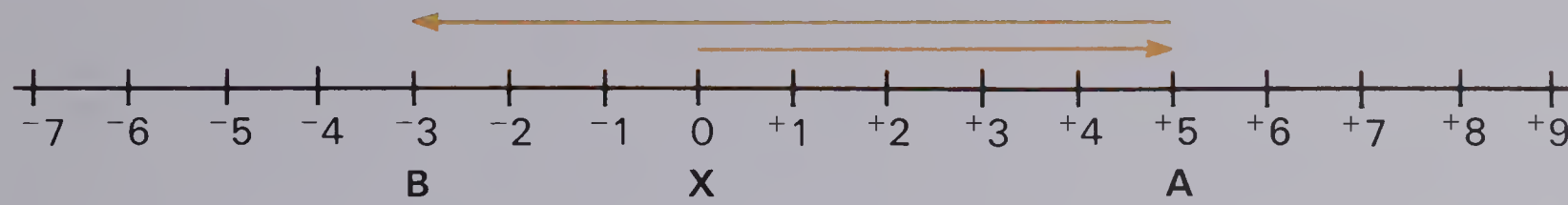
n) E to Q

o) I to P



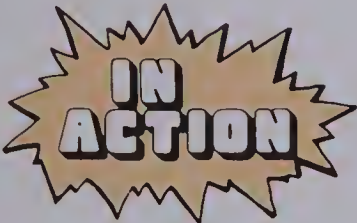
Adding Integers

The arrows show one move on a number line followed by another move.

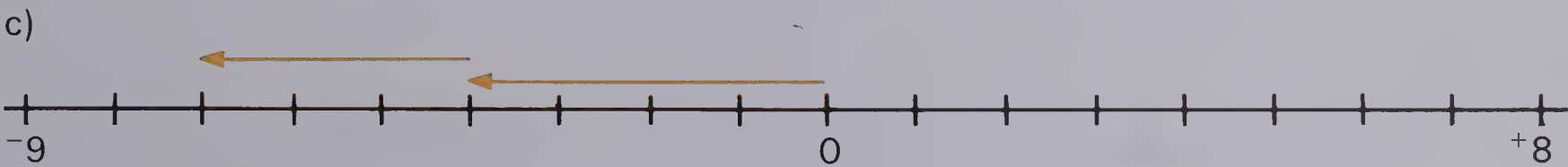
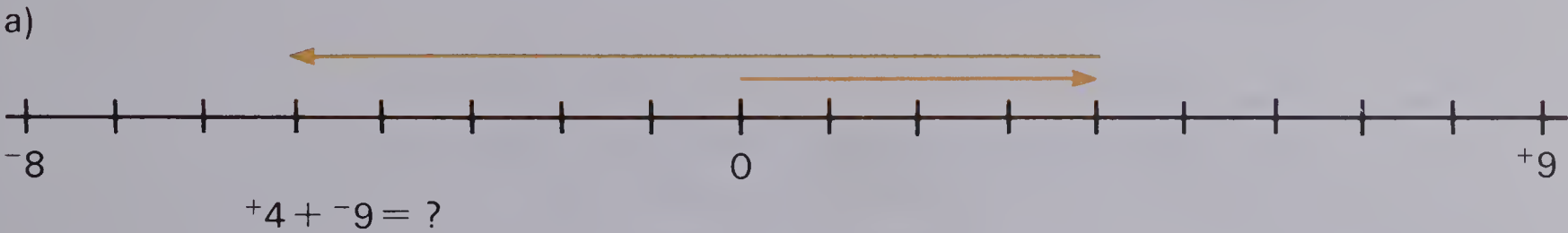


We start at 0. Move from X to A, then from A to B.
 This is a move of 5 units to the right,
 followed by a move of 8 units to the left.
 The final position is B(-3).

$$+5 + -8 = -3$$

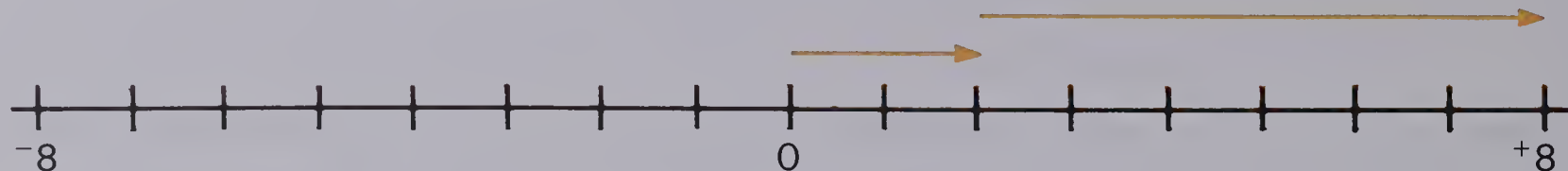


1. Think about the 2 moves on the number line.
 What integer describes each move?
 What integer describes the final position?
 Write the sentence.

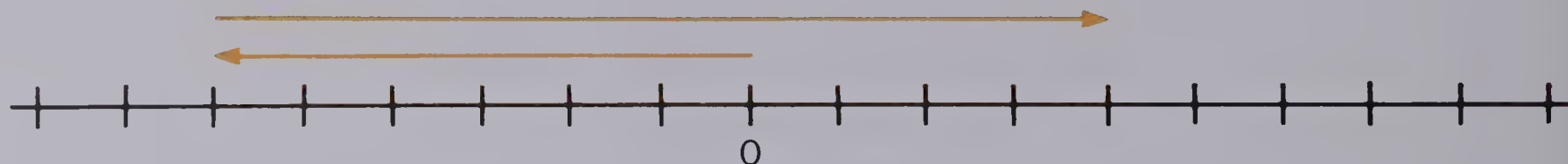




d)



e)



2. Illustrate each sentence by moves on a number line and complete.

- a) $+3 + +2 = ?$ b) $-1 + -4 = ?$ c) $+3 + -2 = ?$ d) $+4 + -6 = ?$ e) $-2 + -5 = ?$
 f) $-4 + -1 = ?$ g) $+3 + -5 = ?$ h) $-2 + +6 = ?$ i) $-5 + +2 = ?$ j) $-4 + +7 = ?$

3. Start at 0. Which integer tells the final position?

- a) Move to the right 3 units, then move to the right 5 units.
 b) Move to the right 6 units, then move to the left 4 units.
 c) Move to the left 2 units, then move to the left 3 units.
 d) Move to the right 4 units, then move to the left 6 units.
 e) Move to the left 1 unit, then move to the left 5 units.
 f) Move to the left 4 units, then move to the right 10 units.

4. What integer tells the final position?

- a) $+4 + +3$ b) $+2 + -1$ c) $-4 + -2$ d) $-2 + +5$ e) $-6 + +3$
 f) $+5 + -6$ g) $+4 + -3$ h) $+1 + -1$ i) $-1 + +1$ j) $+5 + -8$

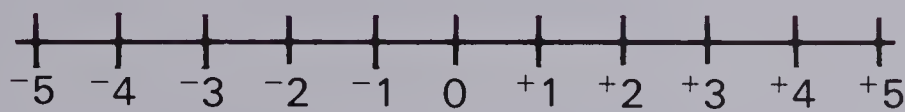
5. Add.

- a) $+3 + +5$ b) $+2 + -4$ c) $+7 + -3$ d) $-4 + +2$ e) $-6 + +8$
 f) $-2 + -4$ g) $-6 + -3$ h) $-5 + +8$ i) $-1 + +7$ j) $-3 + -9$

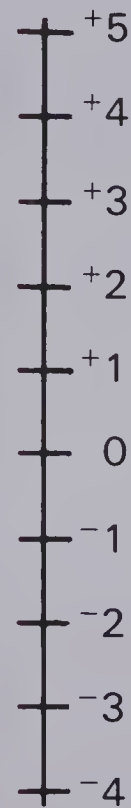


Naming Points in a Plane

A point on an integer number line is named by 1 integer.

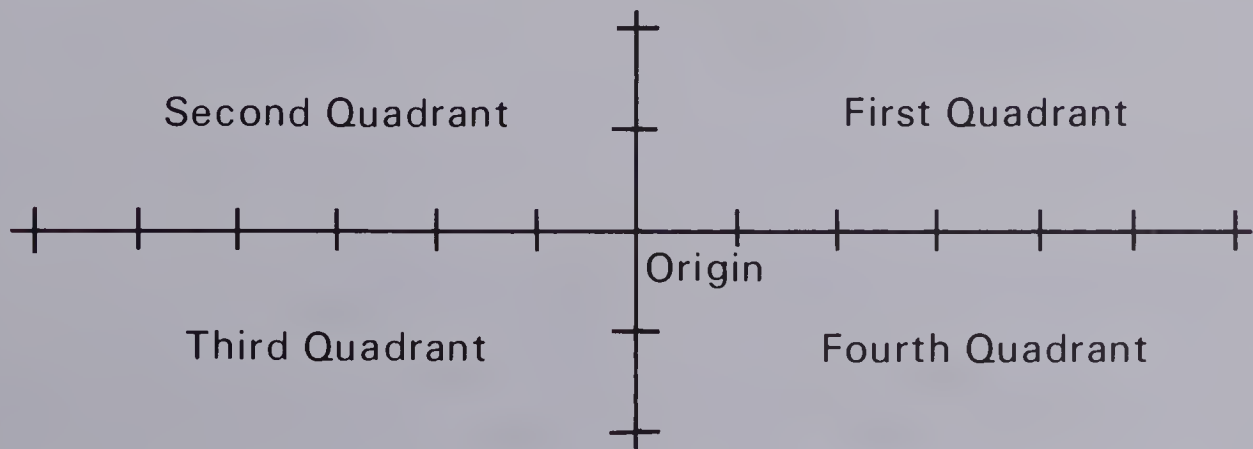


horizontal integer number line



vertical integer number line

Think of a flat surface as a model of a plane.
To name a point in a **plane**, think of 2 integer number lines drawn at right angles and dividing the plane into 4 quadrants.



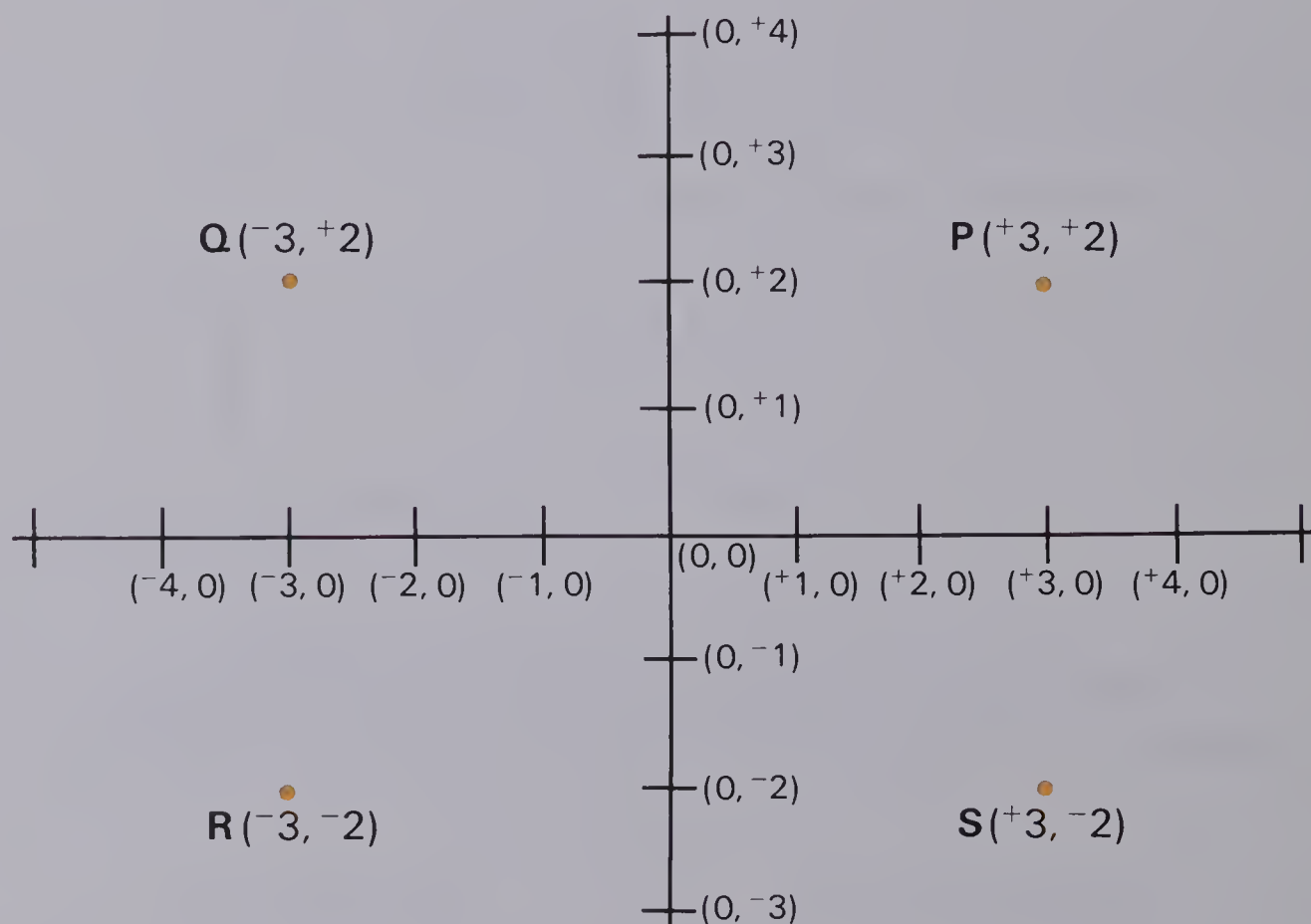
The intersection of the integer number lines is called the **origin**.



A position in the plane is named by an ordered pair of numbers called **coordinates**. At this time, we deal with points that can be named by ordered pairs of integers such as $(+3, -2)$.

The first integer of the ordered pair is related to the horizontal line. It tells how far the point is to the right or to the left of the origin.

The second integer is related to the vertical line. It tells how far the point is up or down from the origin.

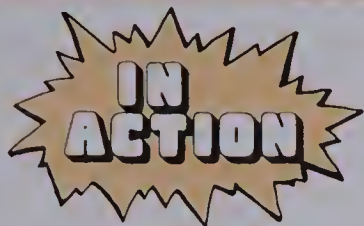


Points on the horizontal line are neither up nor down; their second coordinate is 0. Points on the vertical line are neither right nor left of the origin; their first coordinate is 0.

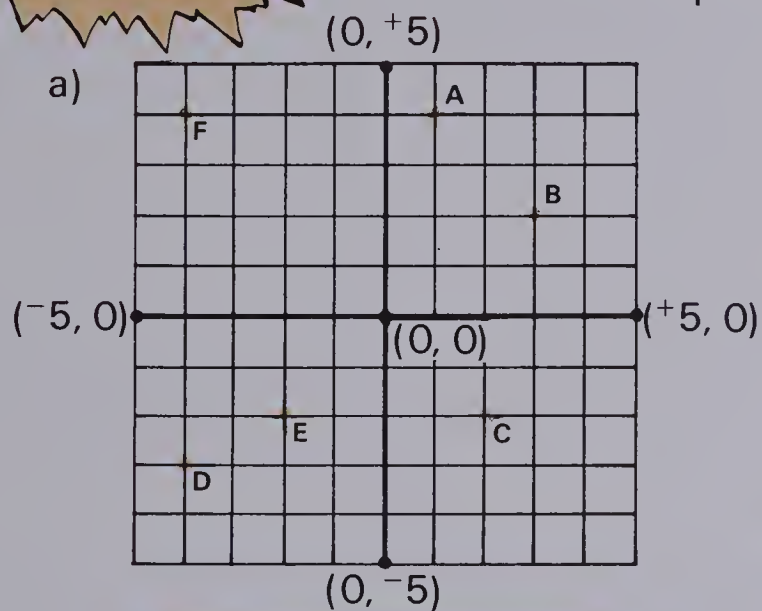
To name a point:

Start at the origin $(0, 0)$.

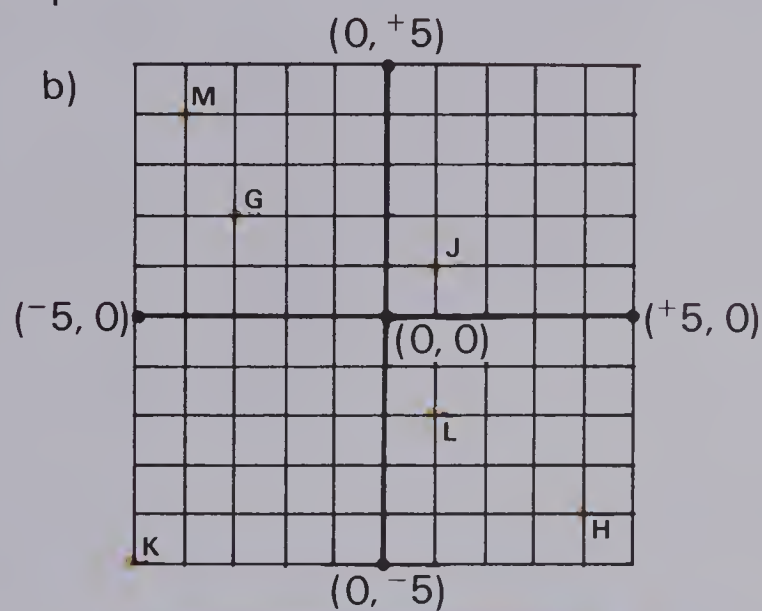
P is 3 units right and 2 units up. Its coordinates are $(+3, +2)$. Describe the position of each of the other 3 points shown.



1. Complete the chart by writing the ordered pairs for the points marked.

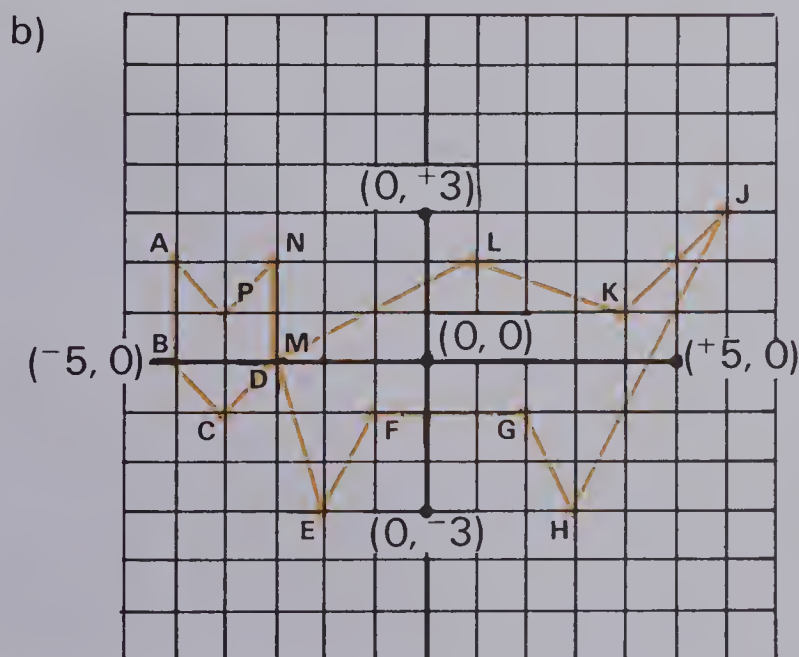
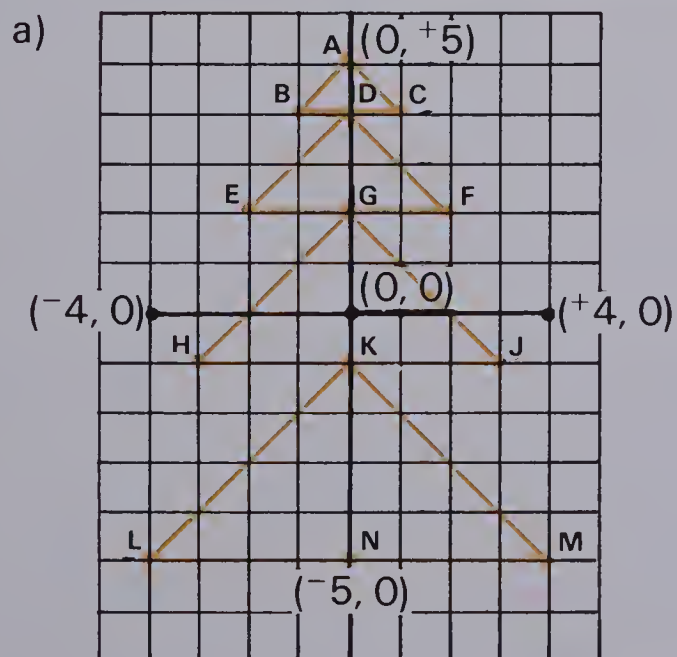


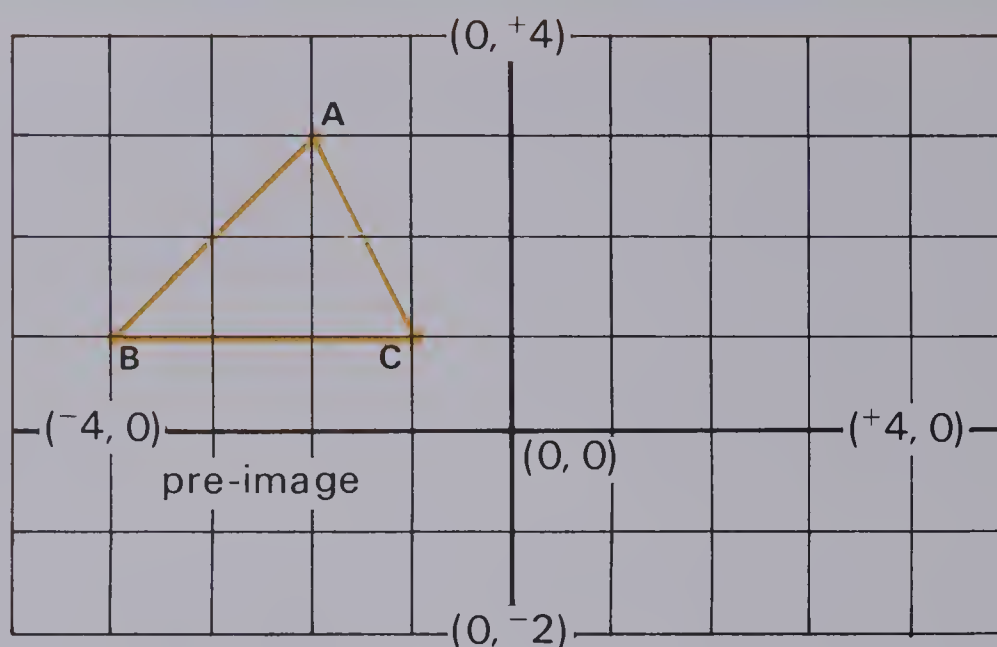
Point	Ordered pair
A	
B	
C	
D	
E	
F	



Point	Ordered pair
G	
H	
J	
K	
L	
M	

2. Write the ordered pairs that name the points.





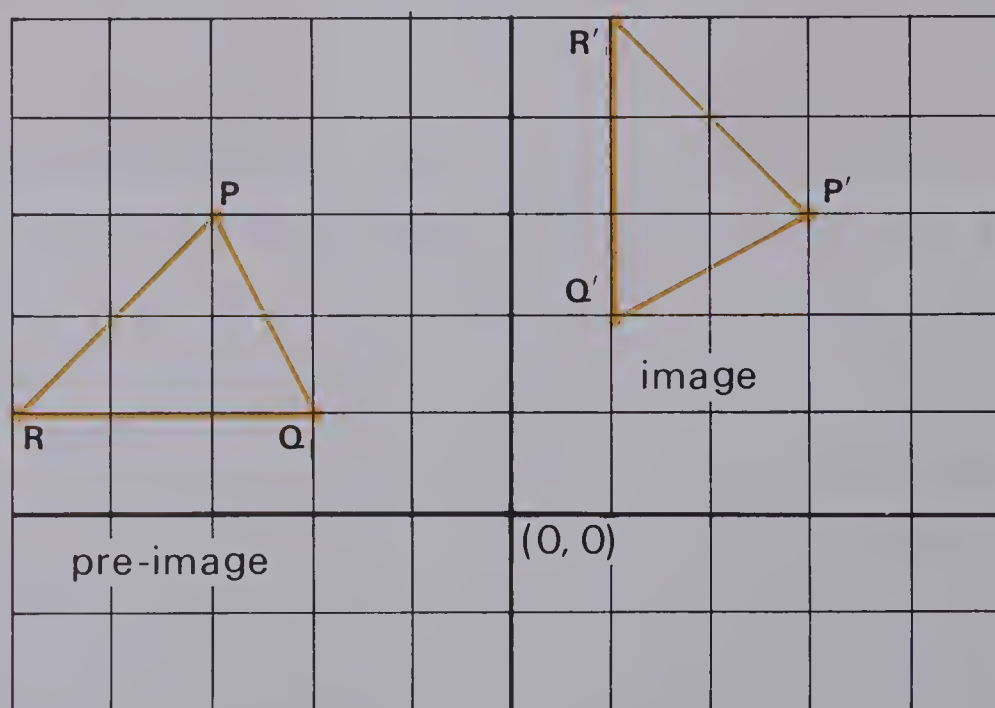
3. What are the coordinates of the vertices of the pre-image ($\triangle ABC$)?

a) Slide $\triangle ABC$ 5 units to the right.

What are the coordinates of the vertices of the image?

b) Flip $\triangle ABC$ about the horizontal line.

What are the coordinates of the vertices of the image?



4. Rotate the pre-image, $\triangle PQR$, about the turn centre $(0, 0)$ 90° clockwise to the position $P'Q'R'$.

What are the coordinates of the vertices of the pre-image and the image?

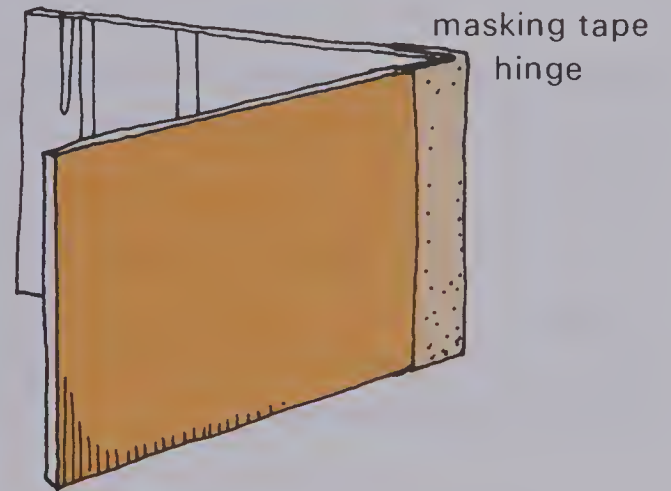
EXPLORE

POLYGONS

Hinge 2 small pocket mirrors with masking tape so that they may be set up at any desired angle.

Position the hinged mirrors on the arms of this 120° angle, so that 1 mirror rests on 1 arm of the angle and the second mirror on the other arm.

When you look toward the vertex of the angle, how many images (including the pre-image) do you see?



Angle = 120°



Position your hinged mirrors on the arms of each of these angles.
For each angle, how many images do you see?
Each time include the pre-image.

Angle = 90°



Angle = 60°



Angle = 72°



Angle = 45°

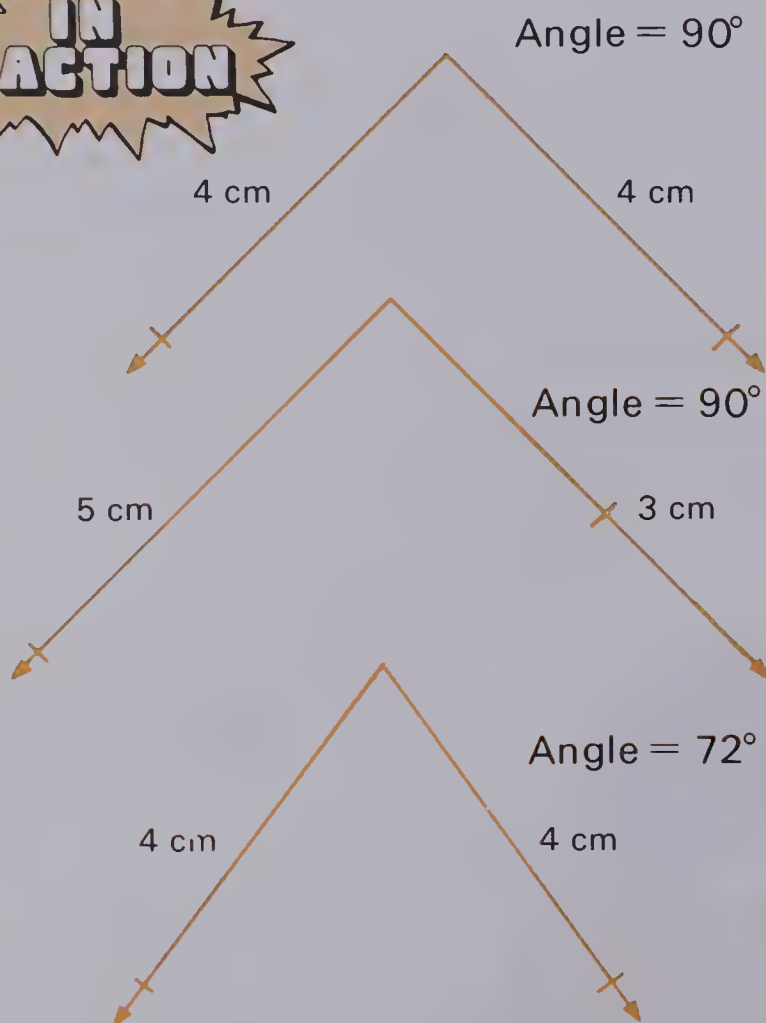
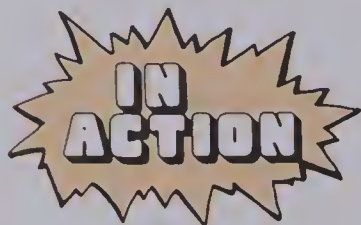




Draw a 120° angle. Mark a point 5 cm from the vertex on each arm. Join the 2 points.

Position your hinged mirrors on the angle.

When you look in the mirrors, what polygon do you see?

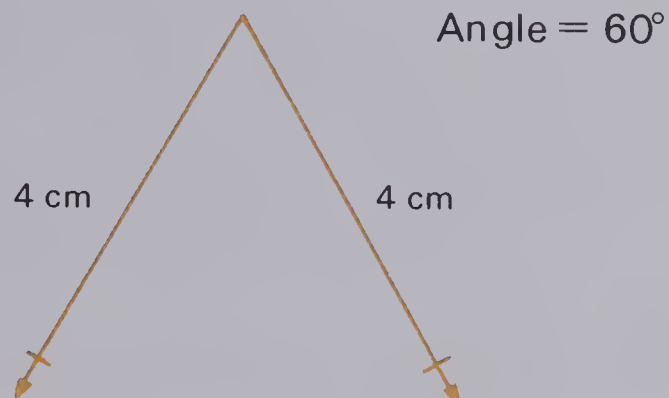


1. a) Draw a 90° angle. Mark points on the 2 arms of the angle, each 4 cm from the vertex. Join the points.
b) Position your hinged mirrors on the arms of the angle. What polygon do you see in the mirrors?
2. a) Draw a second 90° angle. Mark a point 3 cm from the vertex on one arm, and a point 5 cm from the vertex on the other arm. Join the points.
b) Position your hinged mirrors on the angle. What polygon do you see in the mirrors?
3. a) Draw a 72° angle. Mark points on the 2 arms of the angle, each 4 cm from the vertex. Join the points.
b) Position your hinged mirrors on the angle. What polygon do you see when you look in the mirrors?

4. What do you notice about the lengths of the sides of each polygon you see when looking in the mirrors?

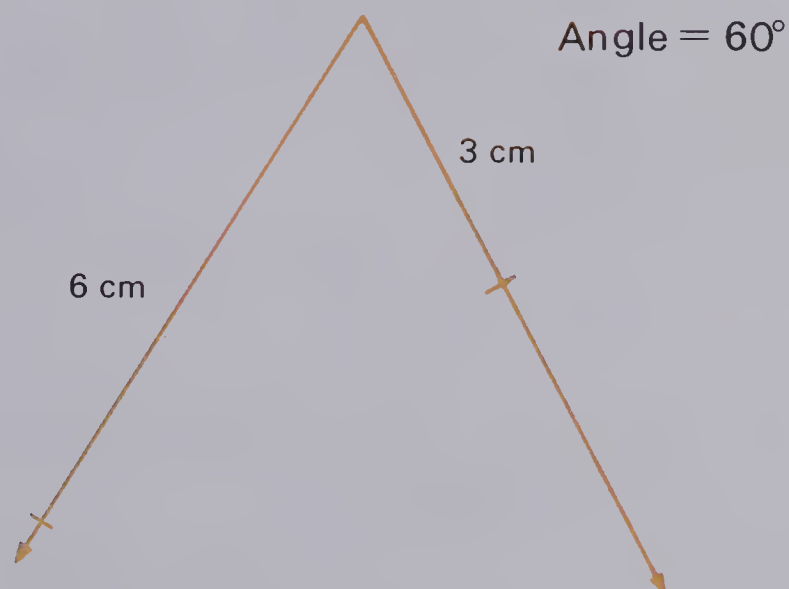


5. a) Draw a 60° angle. Mark points on the 2 arms of the angle, each 4 cm from the vertex. Join the points. What polygon do you think you will see when you look in the mirrors?



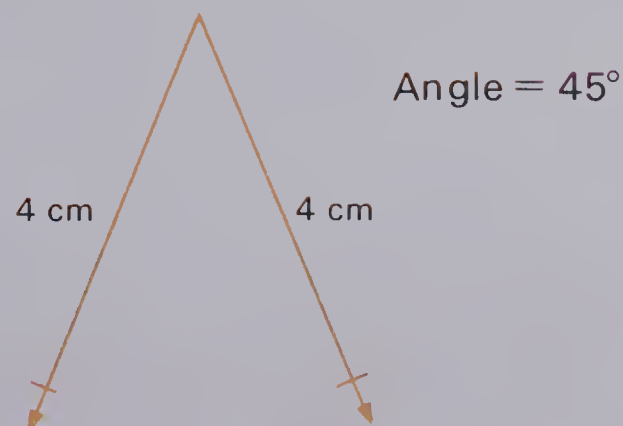
- b) Position the hinged mirrors on the angle. What polygon do you see when you look in the mirrors?

6. a) Draw another 60° angle. Mark a point on one arm 3 cm from the vertex. Mark a point on the other arm 6 cm from the vertex. Join the points. What figure do you think you will see when you look in the mirrors?



- b) Position your hinged mirrors on the angle. What figure do you see in the mirrors?

7. a) Draw a 45° angle. Mark points on the 2 arms of the angle, each 4 cm from the vertex. Join the points. What figure do you think you will see when you look in the mirrors?

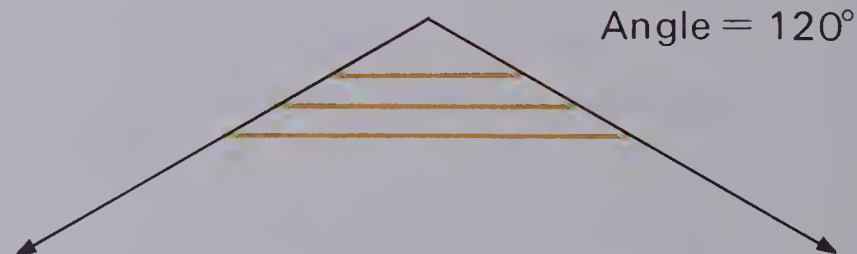
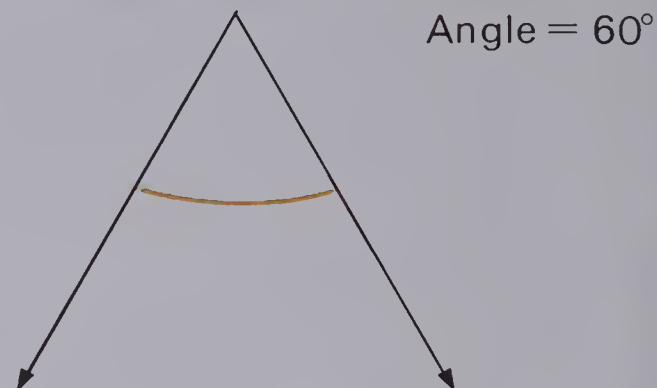


- b) Position the hinged mirrors on the angle. What polygon do you see when you look in the mirrors?

8. What size angle would you draw to be able to see a decagon (10-sided polygon)?



9. Draw a 60° angle. Between the 2 arms of the angle, draw an arc of a circle. You could use your compasses. Position your hinged mirrors and write the name of the figure you see.
10. Investigate forming circular images by drawing arcs in 3 other angles.
11. a) Look at this drawing. Try to predict what figures you will see when you look in the hinged mirrors.
b) Position the hinged mirrors on the angle and describe the figures you see.
12. Draw a figure which, when hinged mirrors are used, will let the viewer see 4 nesting squares.
13. Draw a figure which, when hinged mirrors are used, will let the viewer see 5 concentric circles.
14. Copy and complete the chart to indicate what figures you can form.

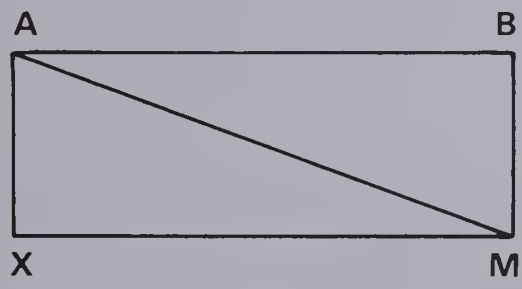
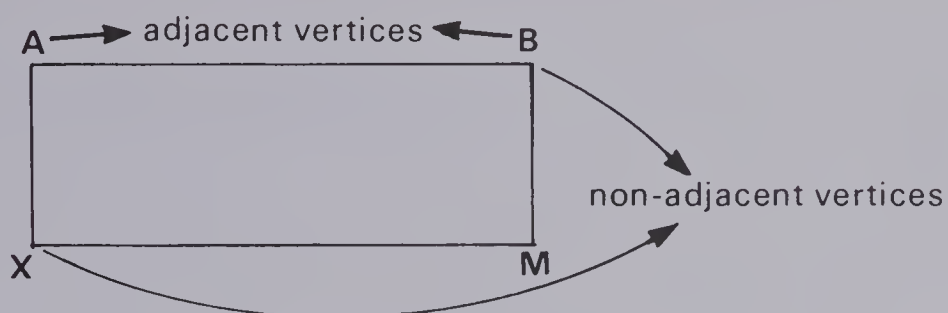


Angle	Equilateral triangle	Square	Parallelogram	Pentagon	Hexagon	Octagon	Circle
120°							
90°							
72°							
60°							
45°							

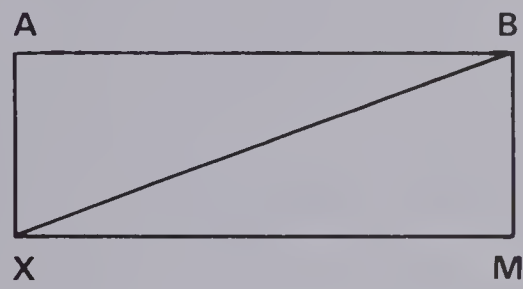


Diagonals

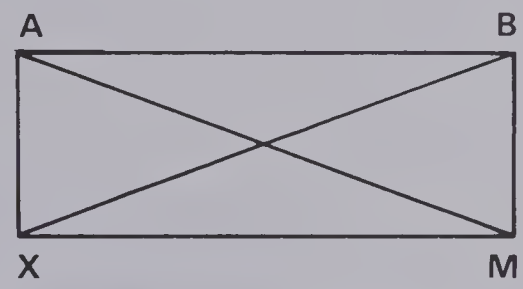
When 2 non-adjacent vertices of a polygon are joined by a line, that line is a **diagonal**.



Line segment AM is a diagonal.

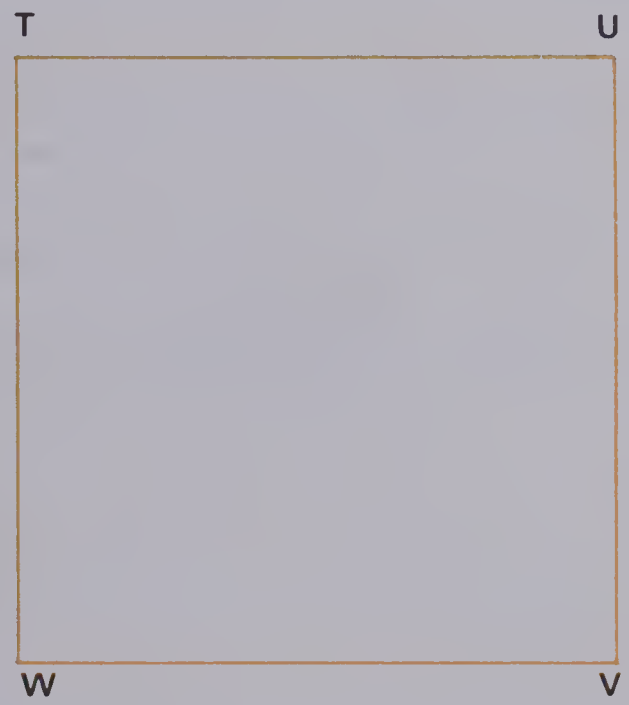


Line segment BX is a diagonal.



Rectangle ABMX has 2 diagonals.

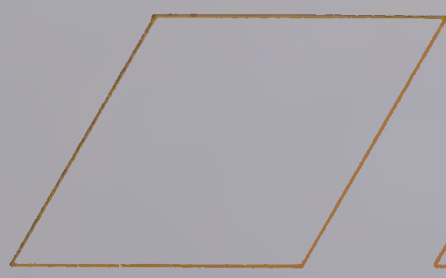
Trace the square TUVW. Draw the diagonals for the square.
How many diagonals does square TUVW have?



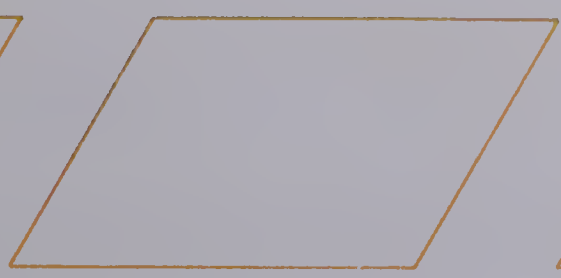
Do all squares have the same number of diagonals? Investigate. Explain.

Do all rectangles have the same number of diagonals?

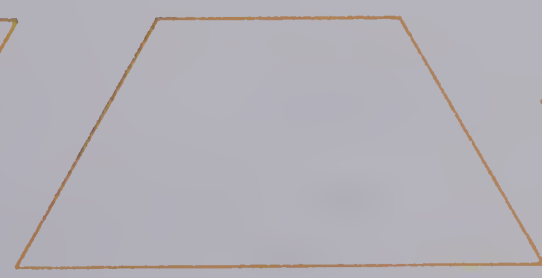
Investigate the number of diagonals for each of these quadrilaterals.



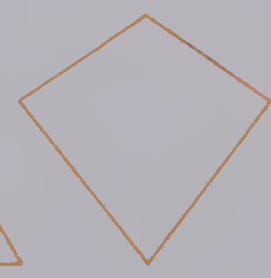
rhombus



parallelogram



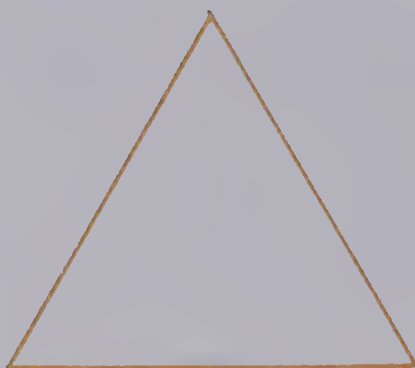
trapezoid



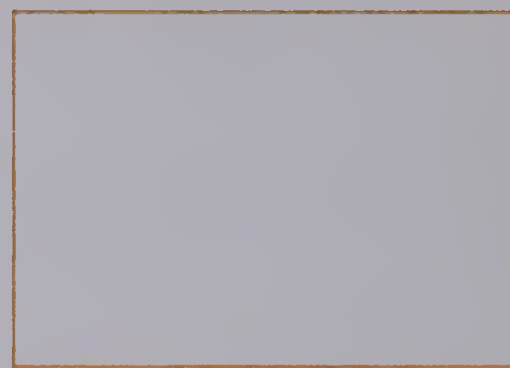
isosceles kite



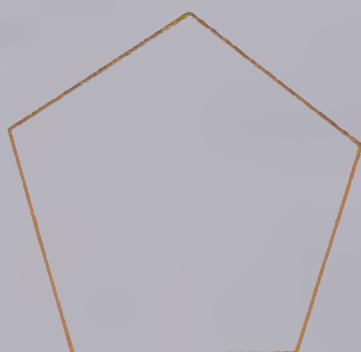
Trace each figure. For each one,
draw all the diagonals and record the number.



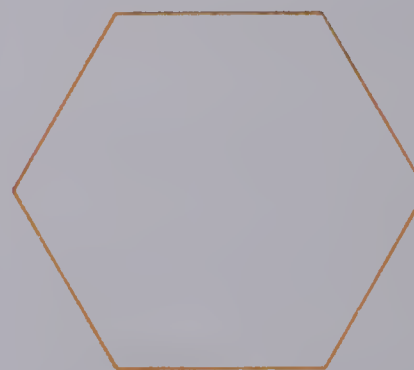
Equilateral triangle:
? diagonals



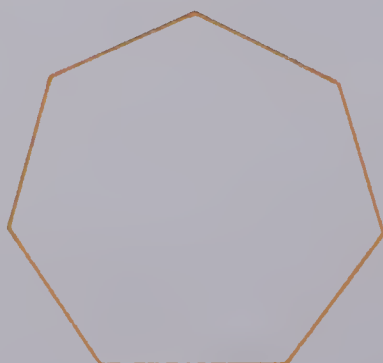
Rectangle:
? diagonals



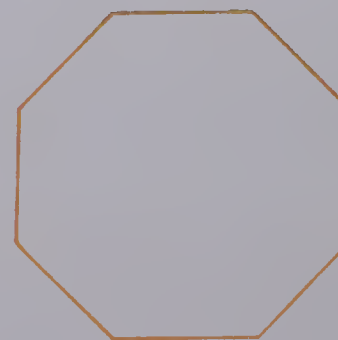
Pentagon:
? diagonals



Hexagon:
? diagonals

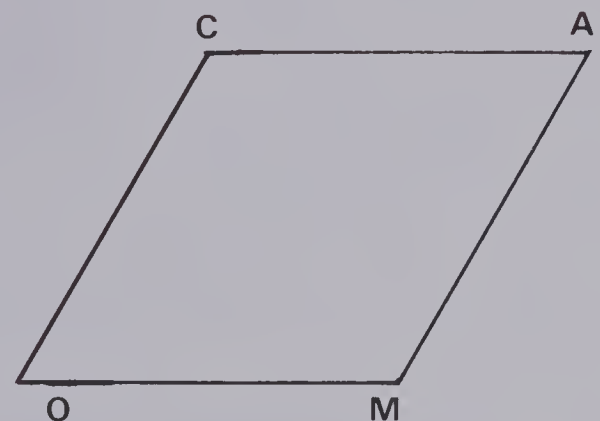
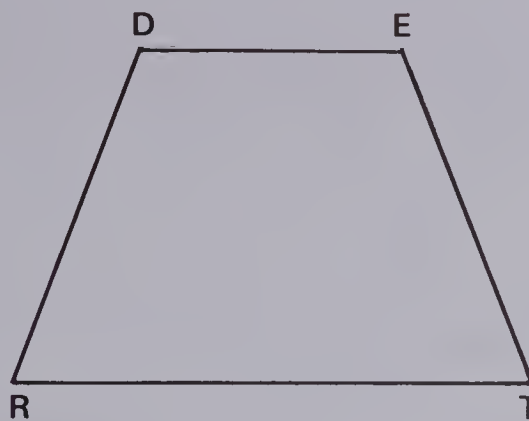
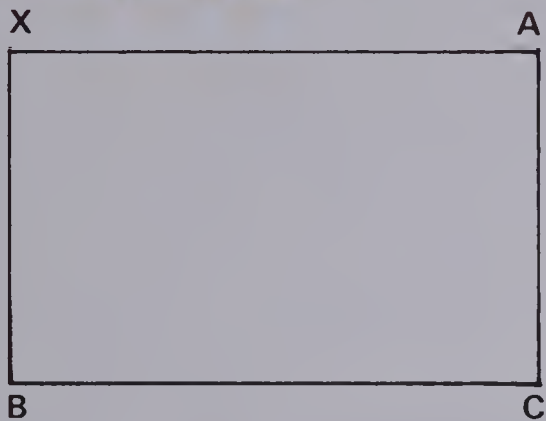
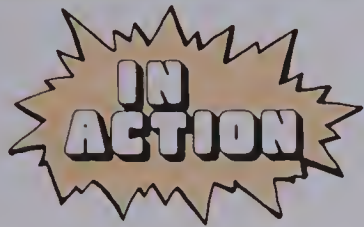


Septagon:
? diagonals

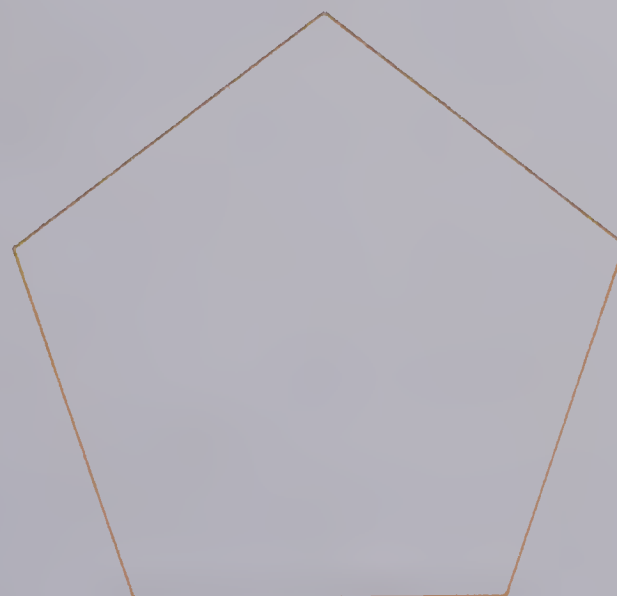


Octagon:
? diagonals

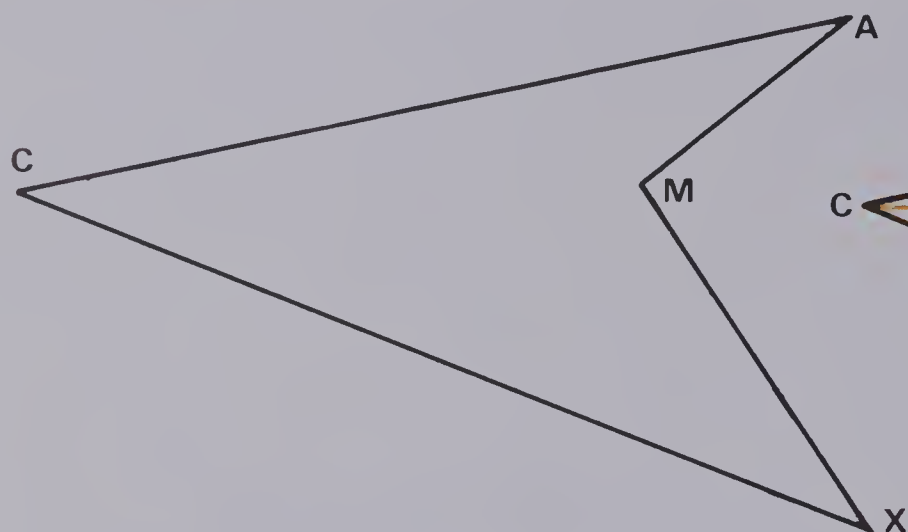
What number pattern do you see developing?
How many diagonals does a 9-sided figure have?
a 10-sided figure? a 12-sided figure?



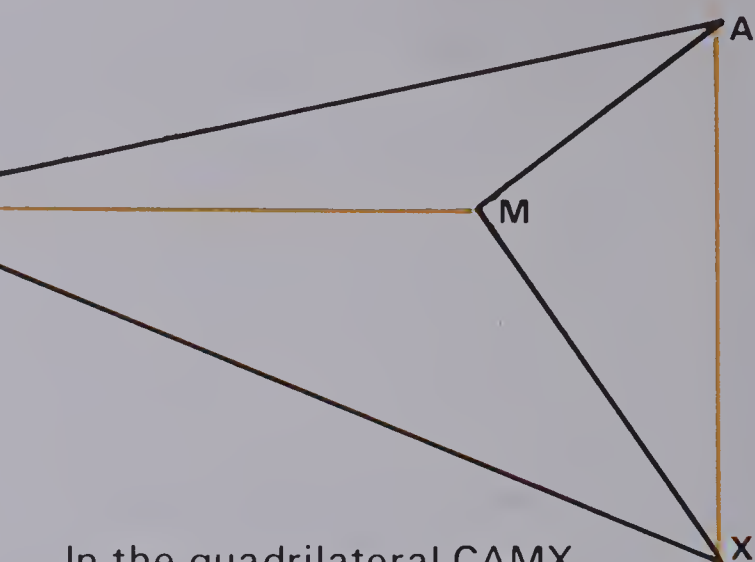
1. a) Trace the figures and draw the diagonals for each one.
b) Name the diagonals for each figure.
c) In which figures are the diagonals congruent?
2. Draw a quadrilateral the diagonals of which
 - a) divide the figure into 4 congruent parts.
 - b) divide the figure into 4 parts, no 2 of which are congruent.
 - c) divide the figure into 4 parts, 2 of which are congruent.
3. Draw a quadrilateral in which the diagonals form 2 acute angles and 2 obtuse angles.
4. Draw a quadrilateral in which the diagonals are not congruent.
5. Draw a quadrilateral in which the diagonals are not congruent.
6. a) Trace this pentagon and draw all the diagonals.
b) What figure is formed by the diagonals at the centre of the pentagon?
c) Draw the diagonals for this figure. What figure is formed by these diagonals?
d) Continue to form similar figures in this way.
How many could you draw?



Concave Polygons/Convex Polygons



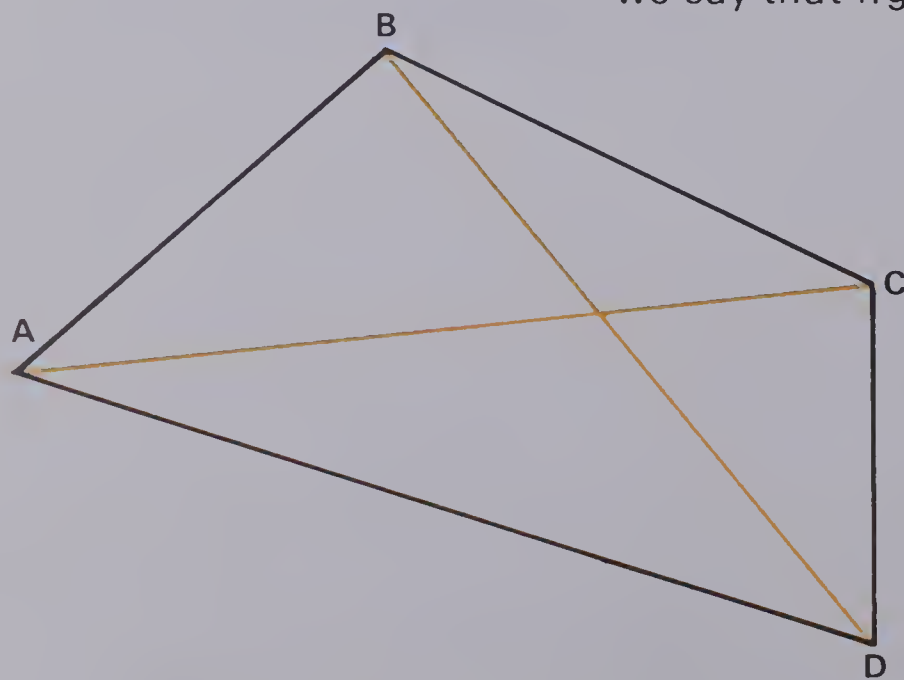
To draw diagonals,
we join non-adjacent vertices.
List the pairs of non-adjacent vertices.
Trace the figure and draw the diagonals.



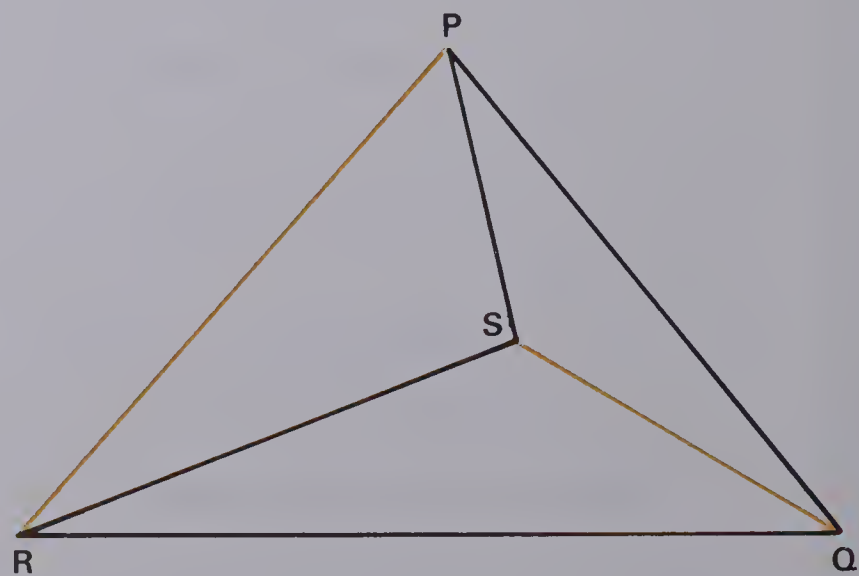
In the quadrilateral CAMX,
1 diagonal is outside the figure.

When any part of a diagonal is outside the figure,
we say that figure is **concave**.

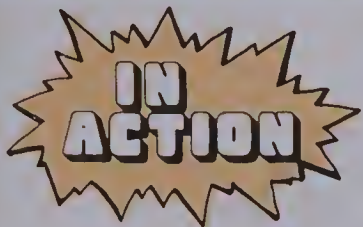
When all the diagonals are completely inside the figure,
we say that figure is **convex**.



convex quadrilateral

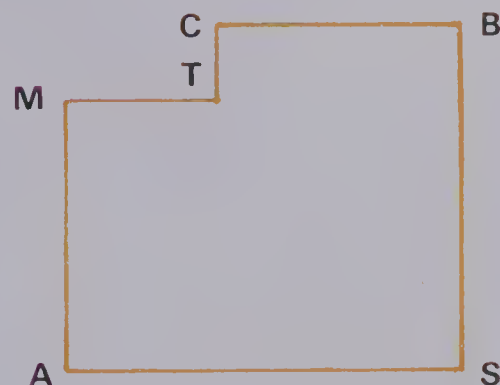
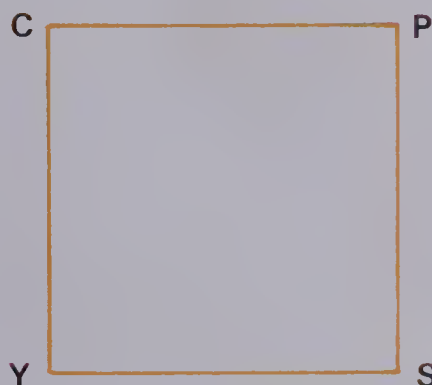
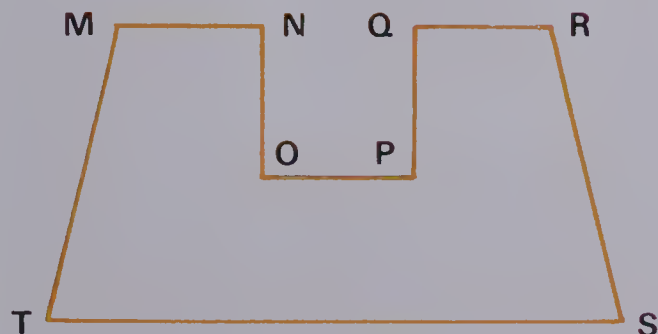
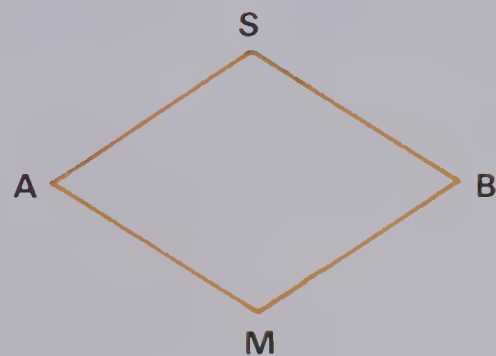
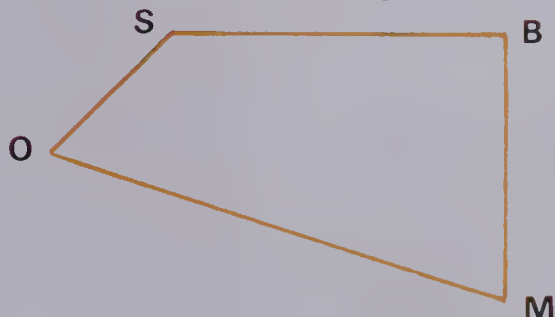
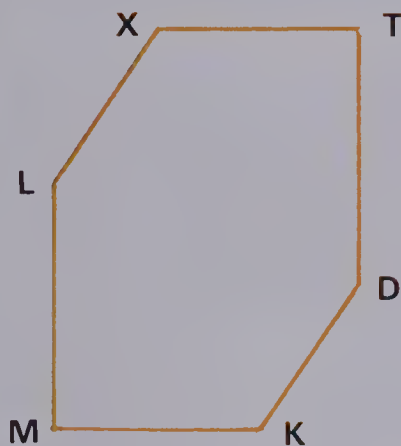
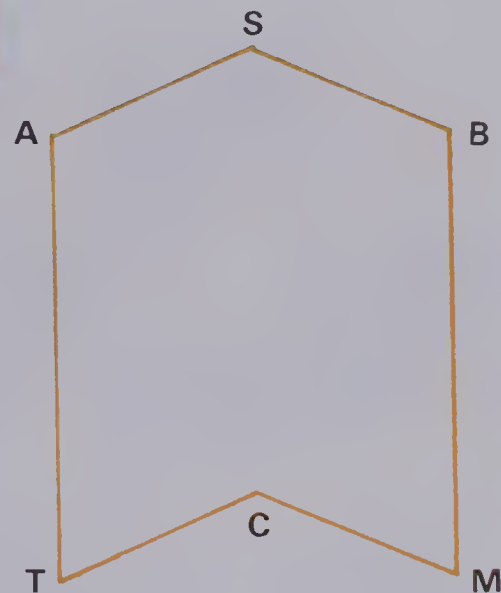
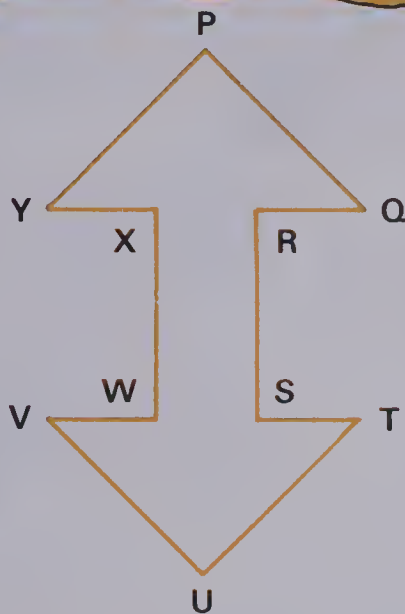
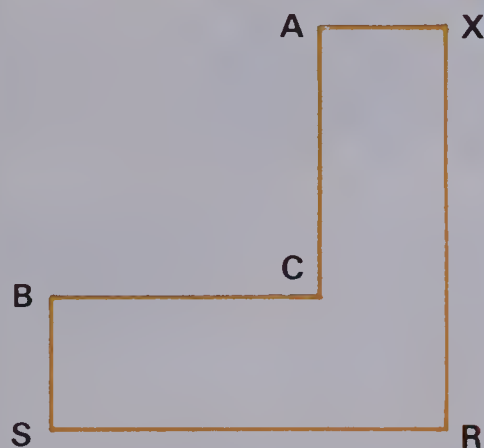


concave quadrilateral



1. Copy this chart. Use it to sort the polygons.

Convex polygons	Concave polygons



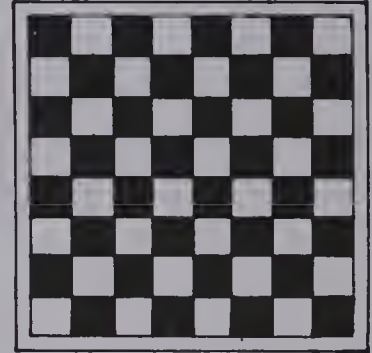
2. Describe the difference between a convex polygon and a concave polygon.

3. List 2 examples of a) concave polygons
b) convex polygons
being used in your environment.

EXPLORE

TESSELLATIONS

Square shapes are often used to cover a surface. This chessboard shows square shapes covering a surface.



Likely some floor in your school or home is covered with square tiles.

Gingham is a fabric pattern that makes use of square shapes. Graph paper is another example of square shapes covering a region. When shapes fit together on a flat surface and leave no spaces nor overlap, we say that the shape **tessellates** the plane.

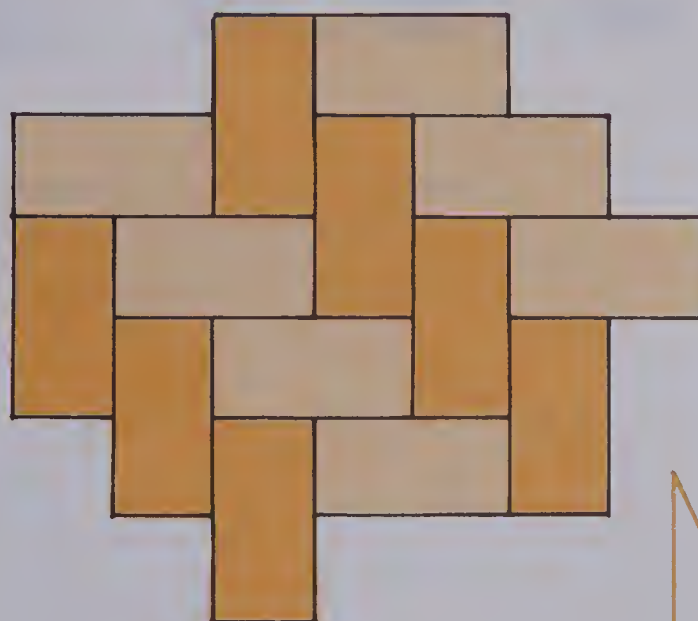
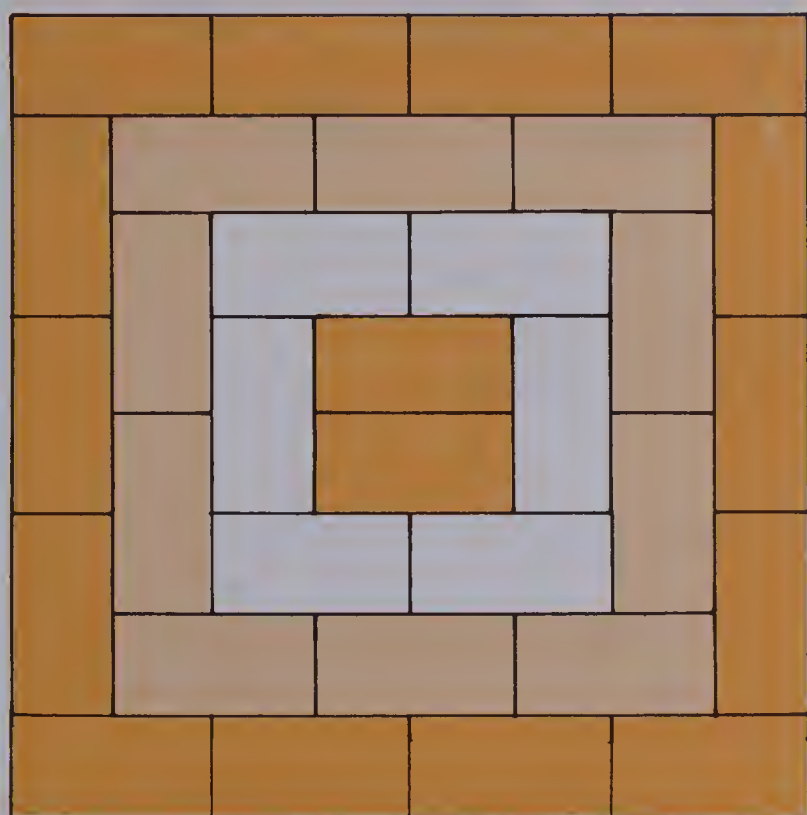
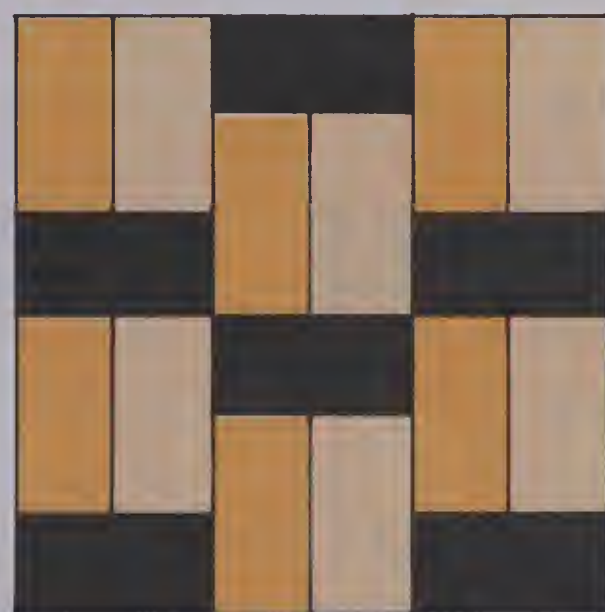


Choose one of the figures below, trace it, and cut it out. Show that the shape can be used to tessellate.





Sometimes the same shape can be used
to tessellate in different ways.
Look at the different designs that can be made
by tessellating with a rectangular shape.



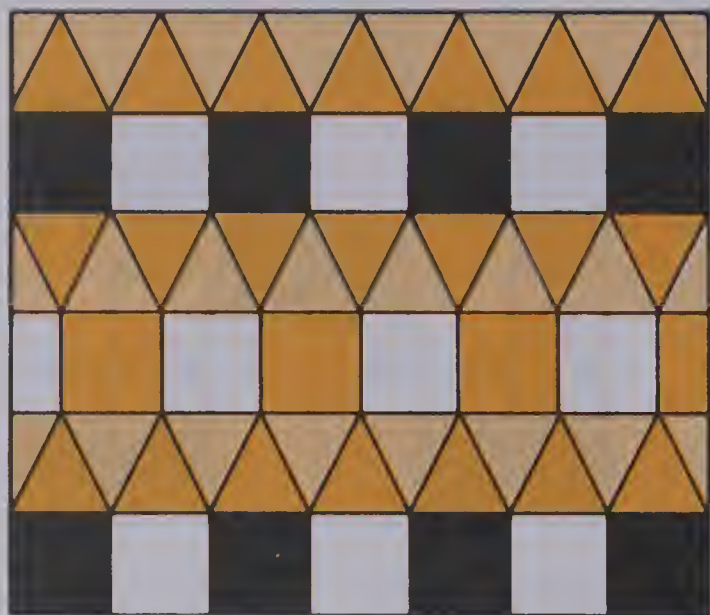
Choose one of the figures on the right,
trace it, and cut it out.
Show 2 different tessellations using the same shape.





Sometimes more than 1 figure is used to tessellate.

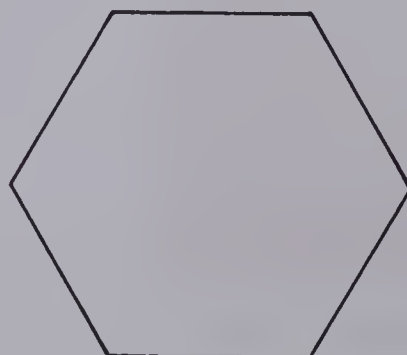
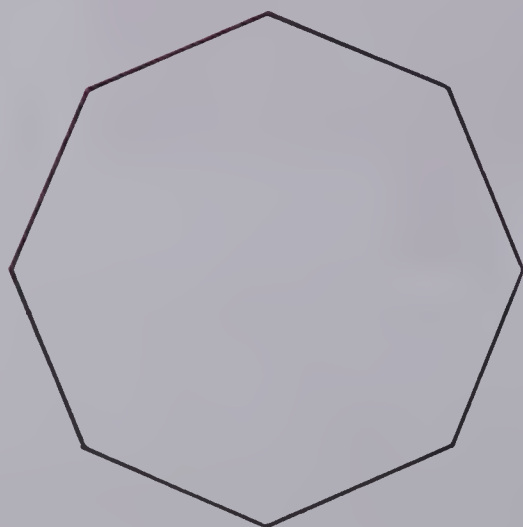
What figures are used
in this tessellation?



What figures are used
in this tessellation?

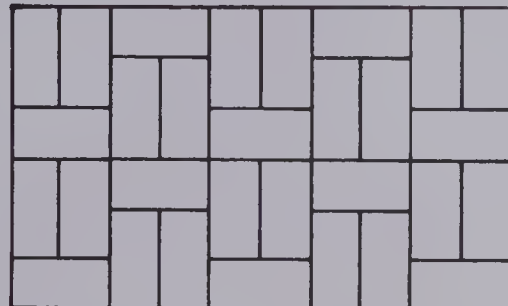
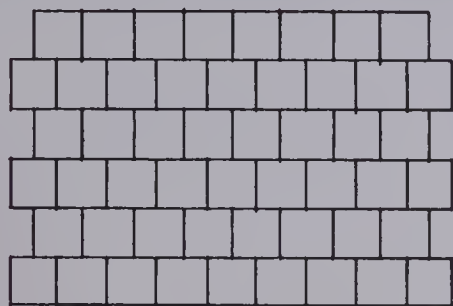


Choose 2 of these figures, trace, and cut them out.
Design a tessellation using both of them.
Colour will add to the beauty of your design.





You have looked at tessellations using the square and the rectangle.



Here is a tessellation using another quadrilateral.

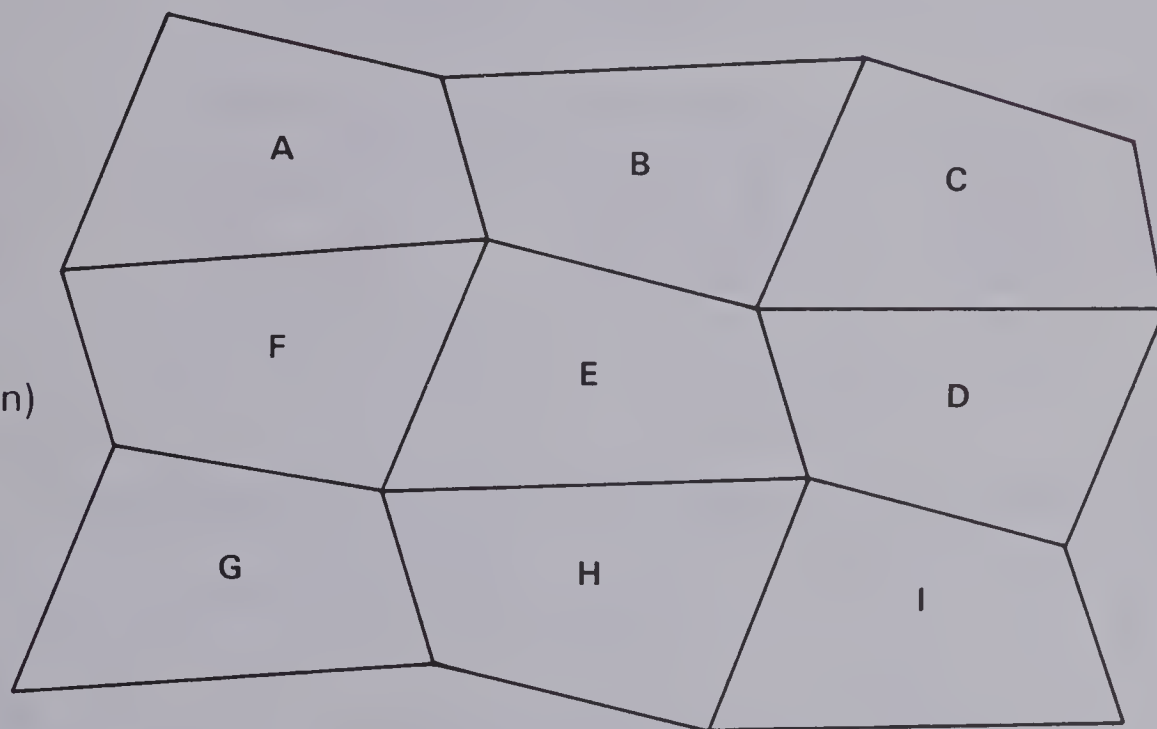
Trace the quadrilateral.

Cut it out.

Use your model to discover examples of slides and turns in the tessellation.

Tell what motion (slide or turn) takes quadrilateral

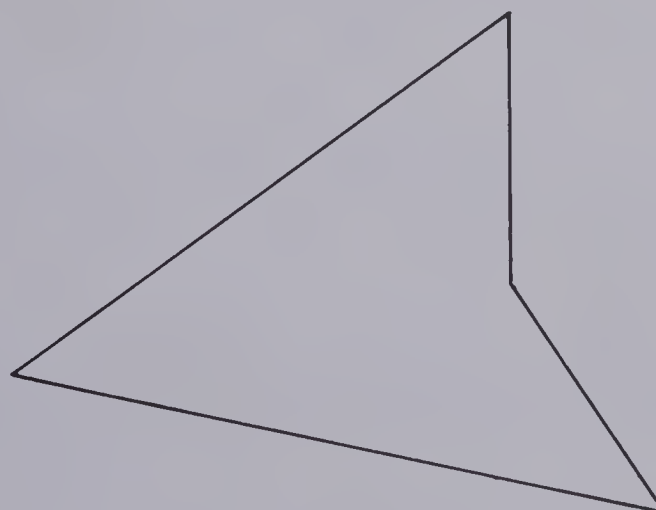
- a) A onto F b) G onto A
- c) A onto I d) E onto H
- e) E onto C f) I onto D

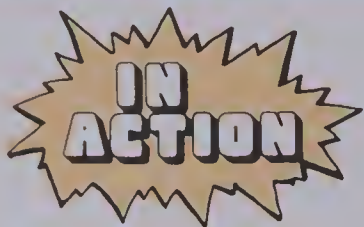


Draw and cut out an irregular quadrilateral of your own.

Trace the shape on paper to show that it will tessellate.

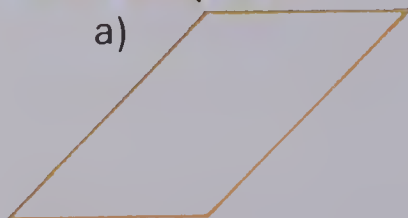
Trace and cut out this quadrilateral. Show that it can be used to tessellate.



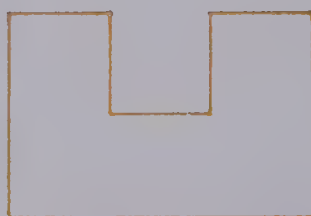


1. Show that each of the figures can be used to tessellate.

a)



b)



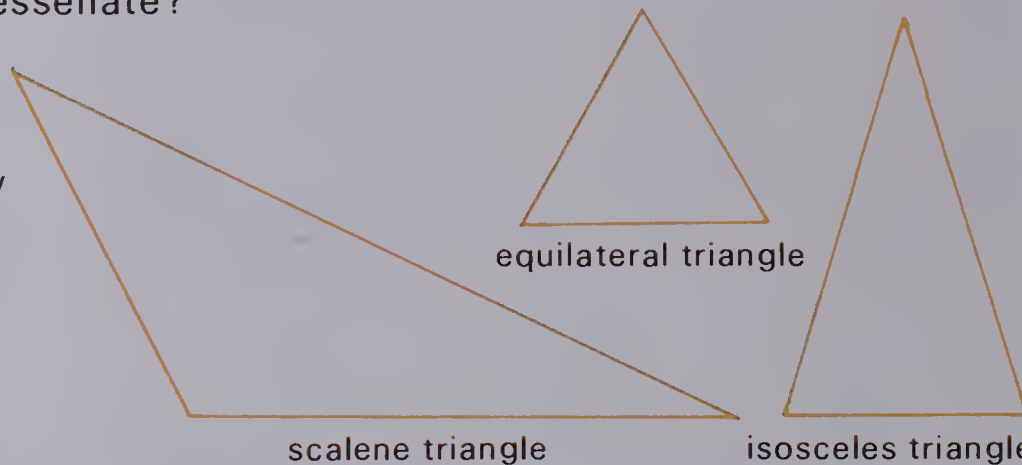
c)



2. Why can circles not be used to tessellate?

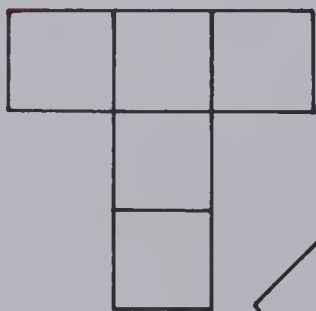
3. a) Trace each of these triangles, and use your tracings to show that any kind of triangle may be used to tessellate.

b) Colour your designs in an attractive way.



4. Which of the pentominoes can be used to tessellate?

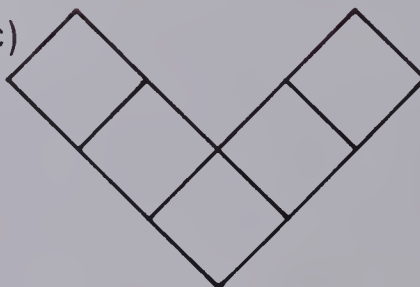
a)



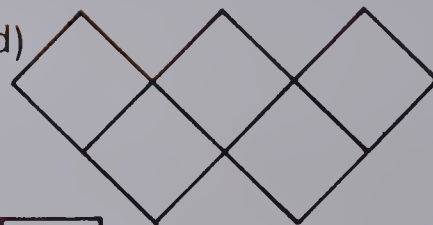
b)



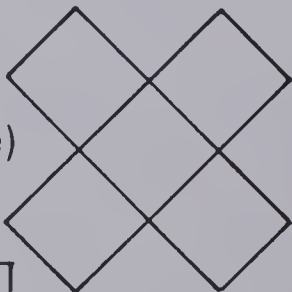
c)



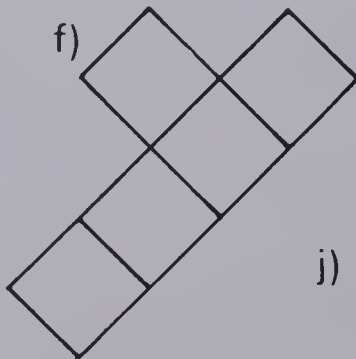
d)



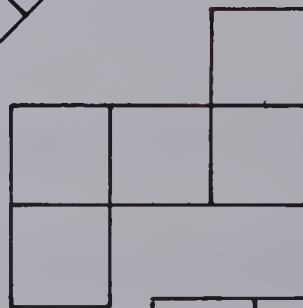
e)



f)



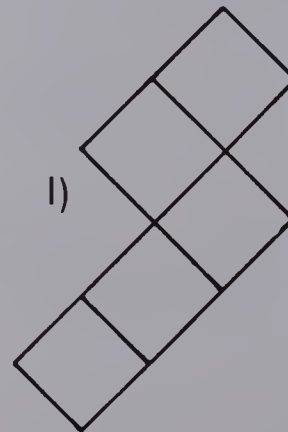
g)



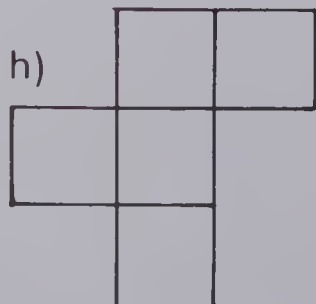
k)



l)



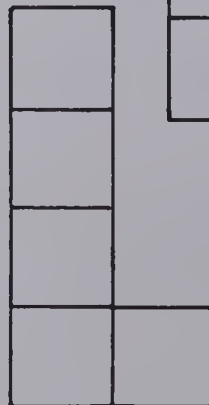
h)



i)

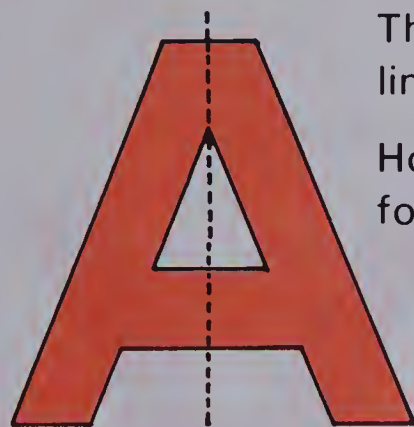


j)



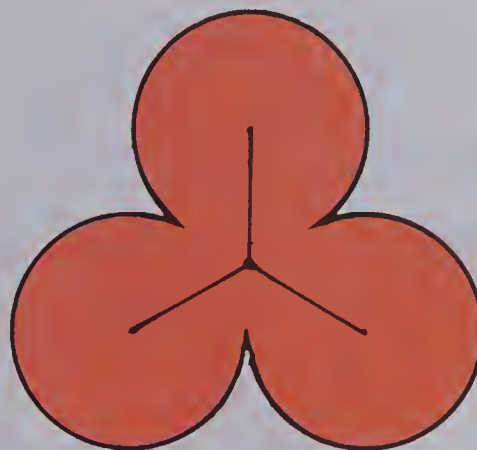
EXPLORE

TRANSLATIONAL SYMMETRY



This shape has
line symmetry.

How do you check
for this property?



This shape has
rotational symmetry.

How do you check
for this property?



This pattern has a different kind of symmetry.

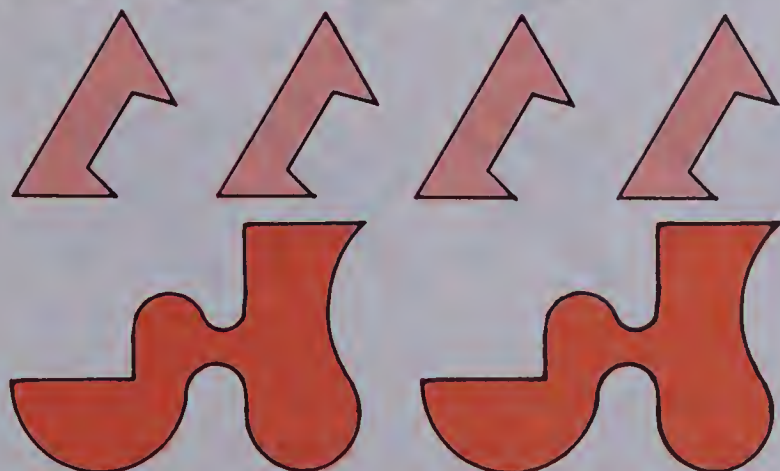
Trace the shape. Place the tracing on the first shape.
Slide the tracing until it fits exactly on the second shape.

Slide it again and again until it fits on the third,
fourth, and fifth shapes.

This pattern has **translational symmetry**.

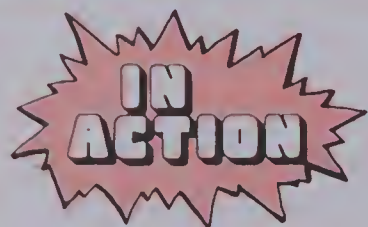


We can slide the letter B to make a
pattern with translational symmetry.



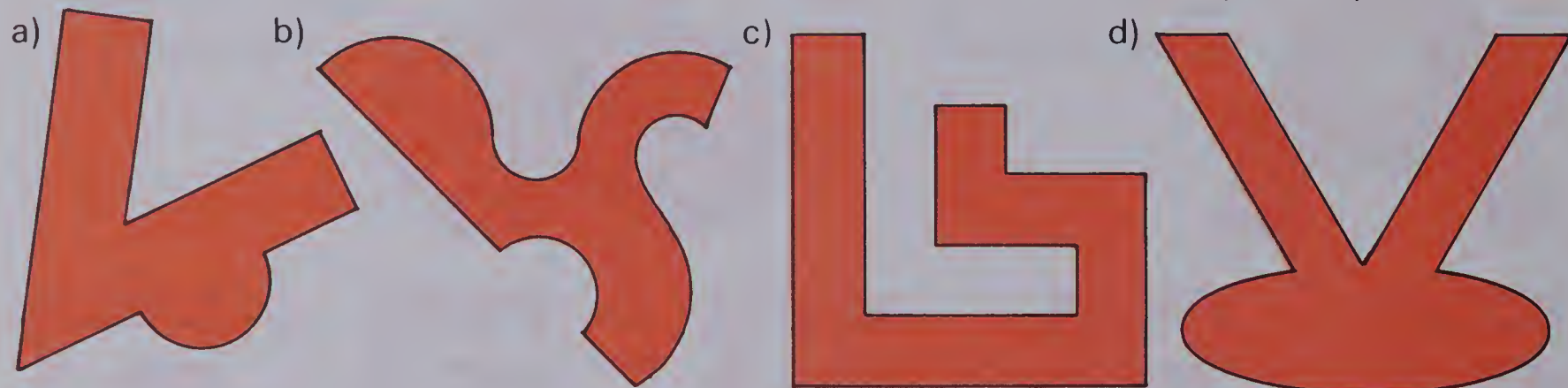
We can slide this shape to make a
pattern with translational symmetry.

Use tracing paper to extend this pattern.
Why does the pattern have translational
symmetry?



1. Trace one of these shapes and cut it out.

Use your model to make a pattern that has translational symmetry.

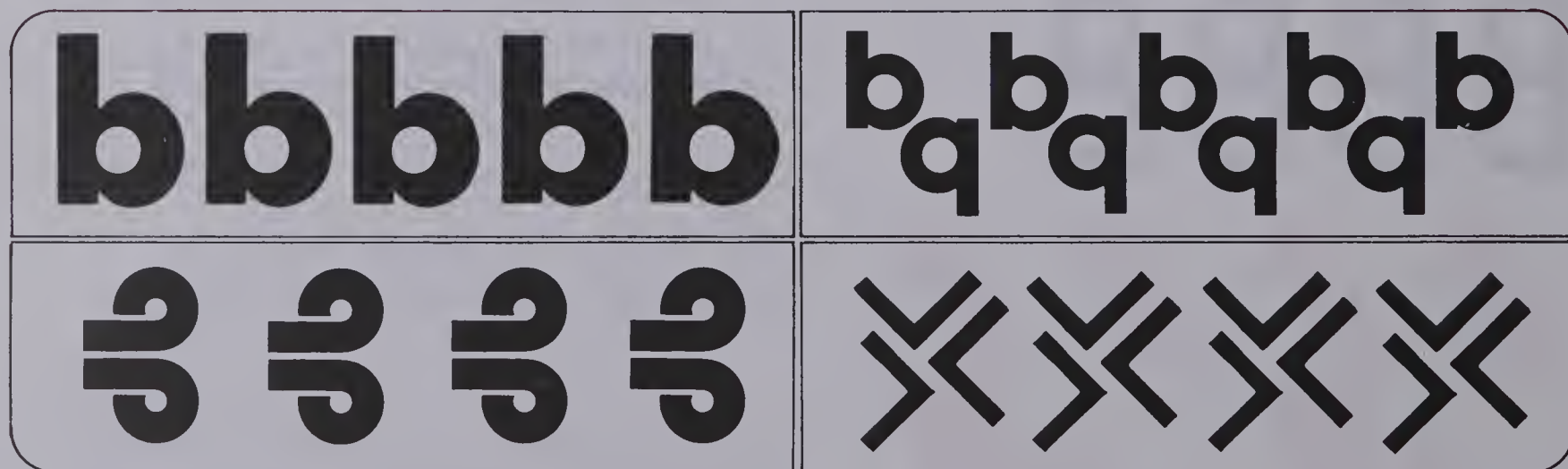


2. There are many examples of translational symmetry in the real world.

Find 3 examples and make a sketch of each.

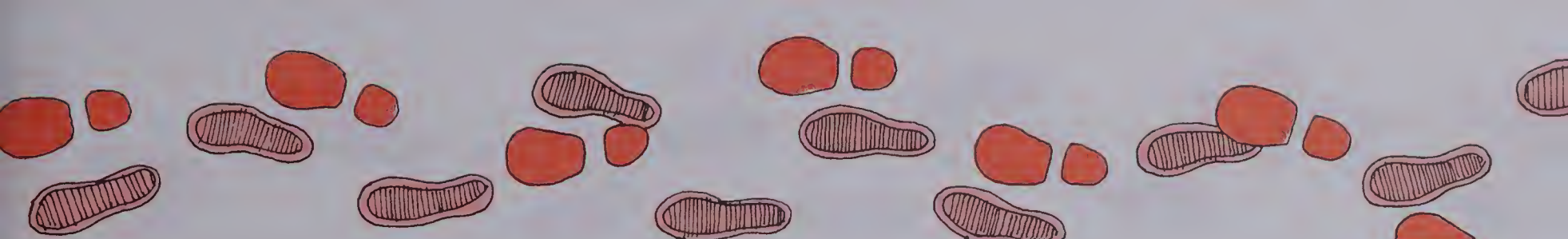
Wallpaper patterns show interesting examples of translational symmetry.

3. Trace the shape that was used to make each translational symmetric pattern.



4. Design a shape. Trace it and cut it out.

Use your model to make a design that has translational symmetry.



RECALL PER CENT/Comparing to 100

Make certain you know the meaning of a **per cent**.

A per cent is a comparison to 100.

70 to 100, $\frac{70}{100}$, and 70% show comparisons to 100.

In a room of 100 students, 60 were girls.

The ratio of girls to students is 60:100 or $\frac{60}{100}$.

The comparison is to 100.

We say 60% of the students were girls.

Suppose there are 25 students in the room and 15 are girls.

The ratio is 15:25 or $\frac{15}{25}$.

We want a comparison to 100.

$$\begin{aligned}\frac{15}{25} &= \frac{15 \times 4}{25 \times 4} \\ &= \frac{60}{100}\end{aligned}$$

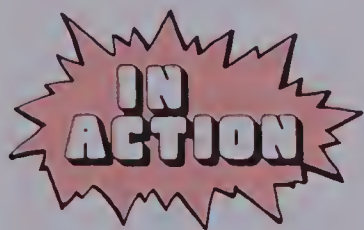
60% of the students were girls.

It is easy to express a decimal as a per cent.

$$0.7 = \frac{7}{10} \text{ or } \frac{70}{100} \text{ or } 70\%$$

$$0.35 = \frac{35}{100} \text{ or } 35\%$$

$$1.6 = \frac{16}{10} \text{ or } \frac{160}{100} \text{ or } 160\%$$



Express each decimal as a per cent.

- | | | | | | | |
|--------|--------|---------|---------|---------|---------|---------|
| a) 0.3 | b) 0.7 | c) 0.9 | d) 0.25 | e) 0.14 | f) 0.75 | g) 0.85 |
| h) 1.4 | i) 1.8 | j) 2.14 | k) 2.01 | l) 3.05 | m) 4.25 | n) 1.11 |



There are 2 kinds of per cent problems that occur frequently in practical applications.

The first kind is finding what per cent one number is of another number.

Out of 5 shots, Ron scored 2 goals.

What per cent did he score?

We need to find what per cent 2 is of 5.

Think: "2 out of 5 is how many out of 100?"

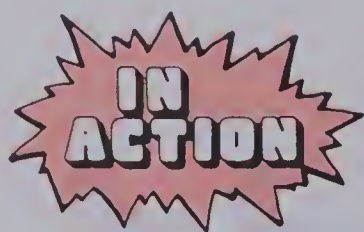
$$\frac{2}{5} = \frac{2 \times 20}{5 \times 20} \text{ or } \frac{40}{100} \\ = 40\%$$

Ron scored 40% of the shots.

The following method is efficient.

$$\frac{2}{5} \times 100 = \frac{2 \times 100}{5} \\ = \frac{200}{5} \text{ or } 40$$

2 is 40% of 5.



1. Find what per cent

a) 3 is of 4

b) 1 is of 4

c) 4 is of 5

d) 6 is of 10

e) 7 is of 20

f) 20 is of 25

g) 40 is of 50

h) 8 is of 50

i) 100 is of 200

j) 90 is of 150

k) 15 is of 10

l) 25 is of 20

2. Find what per cent

a) 5 is of 7

$$\frac{5}{7} \times 100 = \frac{500}{7}$$

= 71.4, to the nearest tenth

5 is 71.4% of 7, to the nearest tenth.

b) 3 is of 7

d) 9 is of 11

f) 7 is of 24

h) 8 is of 5

c) 8 is of 15

e) 6 is of 16

g) 9 is of 7

i) 12 is of 5



The second kind of application of per cent is finding a per cent of a number.

A sporting-goods store offered a discount of 15% on 10-speed bicycles.

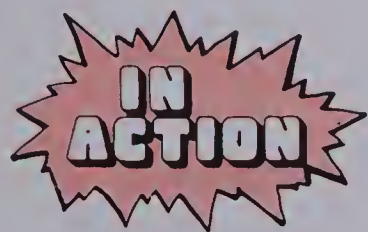
What is the discount on a bicycle if the regular price is \$160?

We find 15% of 160, or $\frac{15}{100} \times 160$.

The following method is efficient.

$$15\% \text{ or } \frac{15}{100} = 0.15$$

$$15 \text{ of } 160 = 0.15 \times 160 \\ = 24.00$$



15% of \$160 is \$24. The discount offered is \$24.

1. Find.

a) 7% of 50

b) 8% of 60

c) 5% of 90

d) 9% of 80

e) 12% of 70

f) 11% of 120

g) 15% of 150

h) 18% of 200

i) 20% of 175

j) 25% of 75

k) 30% of 225

l) 45% of 175

2. In a clearance sale, 6 first-day bargains were offered. Complete the chart.

Article	Regular price	Discount (%)	Discount	Sale price
Refrigerator	\$350	35%	\$122.50	
Stove	\$285	45%		
TV	\$875	55%		
Stereo set	\$525	33%		
Washer	\$295	40%		
Dryer	\$225	45%		



EXPLORE

PROBLEM SOLVING/Using a Sample

Bill was born in September. He said that he thought that more people were born in the month of September than in any other month of the year.

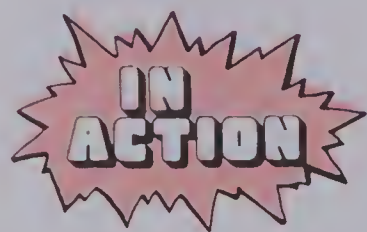
Is this a true statement? How can you find out?

It is possible to use your class as a **sample** of a much larger population. From the data collected about your class, you can predict the results for a larger group.

Problem Determine in which month of the year the greatest number of students in your class were born.

1. You can solve the problem by taking a poll. Ask each student the question, "In which month were you born?"
2. Record the answers to the question in a tally.
3. Determine the results for your class, then predict the situation for a larger group—your school, the Canadian population.

Compare your results with Bill's statement.



1. Isobel wanted to make a bar graph to show where the Grade 6 students planned to spend part of their summer holidays. She didn't know the data necessary to make her graph. Tell how you would collect data from your Grade 6 classes.
 - a) What questions would you ask?
 - b) Draw a tally that you would use to record the data.
2. What is the most frequently occurring 2-letter word in your reader? Choose any page as a sample of the entire book.
 - a) Draw and complete a tally.
 - b) What is your conclusion for this page?
 - c) What is your prediction for the book?



Using a Random Sample

We use a **random sampling** of data to represent a larger body of data.

In which month of the year were the greatest number of students in your school born?

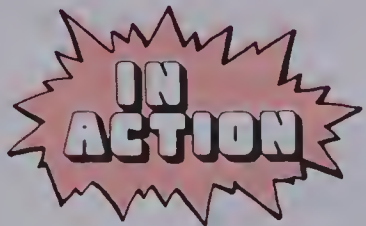
If there were 500 students in your school, it would take a long time to ask each student your question. Instead you ask only a sample of the students and predict the answers for the whole group from the results of the sample.

For a sample of 50 students, you would ask every tenth student. For a sample of 100 students, you would ask every fifth student.

Your sample should not be too small.

What are the advantages of this method?

What are the disadvantages?



1. Design a random sampling method to determine the most common colour of cars.
2. Create a problem of your own.
Describe the sampling method you would use.
3. What is the most frequently used letter of the alphabet?
 - a) Choose a reader or a novel.
Select any 2 lines from 2 different pages for your random sample.
Draw and complete a tally.
What is your conclusion?
 - b) From the same book, select any 2 lines from 5 different pages.
Draw and complete a tally.
What is your conclusion?
 - c) From the same book, select any 2 lines from 10 different pages.
Draw and complete a tally.
What is your conclusion?
 - d) Compare your conclusions for 2, 5, and 10 pages. Does increasing the size of the sample make a difference?



Reading a Distance Chart

Each city names a column and a row.

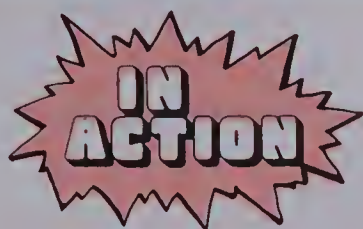
Barrie	Belleville	Brampton	Brockville	Cornwall	Hamilton	Huntsville	Kenora	Kingston	Kitchener	London	Montreal	Niagara Falls	North Bay	Ottawa	Pigeon River	Rainy River	Sarnia	Toronto	Winnipeg
254																			
88	211																		
423	156	379																	
518	248	475	95																
143	251	63	420	515															
127	315	216	555	462	270														
1794	2018	1884	2187	2282	1939	1691													
333	79	290	90	185	330	394	2096												
168	278	80	446	537	58	296	1984	355											
251	357	164	526	621	125	376	2045	436	103										
642	389	600	220	126	640	664	2186	310	661	746									
206	314	125	483	578	63	333	2001	392	116	189	703								
256	444	344	690	470	400	129	1628	465	425	507	558	463							
428	220	450	116	113	465	467	1990	156	481	561	196	528	362						
1372	1595	1460	1763	1862	1516	1347	560	1673	1541	1622	1765	1578	1206	1569					
1987	2209	2076	2378	2473	2130	1969	235	2288	2124	2236	2380	2193	1816	3183	753				
378	463	274	632	729	232	489	2158	542	193	98	852	288	619	677	1734	2349			
79	175	37	344	439	63	206	1874	254	93	172	563	138	335	386	1451	2065	290		
1986	2222	2088	2395	2486	2142	1980	204	2300	2169	2249	2454	2109	1834	2193	766	344	2362	2080	

The Souza family wishes to travel from Brockville to Barrie. They checked the distance they must travel by looking at the distance chart on their road map.

The distance to be travelled is found by locating the intersection of the column called Barrie and the row called Brockville. Mrs. Souza found that the distance is ? km.

How far would the Souza family travel if they planned to stop for lunch at Toronto?





1. Find the distance between:
 - a) Cornwall and Brockville
 - b) Belleville and Huntsville
 - c) Kitchener and Kenora
 - d) North Bay and London
 - e) Sarnia and Niagara Falls
 - f) Ottawa and Brampton
 - g) Pigeon River and Rainy River
 - h) Toronto and Barrie.
2.
 - a) Between which 2 places is there the greatest distance?
What is this distance?
 - b) Between which 2 places is there the least distance?
What is this distance?
3. What is the difference in distance between each pair of places?
 - a) Kitchener and Kingston; Kitchener and Sarnia
 - b) Ottawa and Rainy River; Ottawa and Winnipeg
 - c) Kenora and London; Kenora and Hamilton
 - d) North Bay and Pigeon River; North Bay and Montreal
 - e) Cornwall and Sarnia; Brampton and Belleville
4. Calculate the distance travelled.
 - a) Toronto to Kingston to Ottawa to Toronto
 - b) Montreal to Ottawa to North Bay to Montreal
 - c) London to Barrie to North Bay to Kenora
to Toronto to London
 - d) Niagara Falls to Sarnia to Huntsville
to Toronto to Niagara Falls
5. Plan your own round trip to visit 4 cities
named on this chart.
Calculate the total distance you would travel.





Reading A Timetable for Information

All service operates on local time – daylight or standard – whichever is in effect locally.

↓ Super Continental 1 Daily		MONTREAL – OTTAWA – CAPREOL		↑ Super Continental 2 Daily	
		12 Eastern Time			
		km	Eastern Time		
	21:20	0	dp MONTREAL, QUÉ.		10:00
	21:41	19	Dorval, Qué. ①		09:30
	23 45				07:30
	23 59	186	ar } OTTAWA, ONT.		07:15
			dp }		
②③	01:15	282	Portage-du-Fort, Qué.	②③	05:36
	01:55	326	Pembroke, Ont.		04:58
②④	03:10	413	Lake Traverse	②⑤	03:45
②③	03:40	434	Odenback	②③	03:20
	04:20	450	Brent		03:05
②⑥	04:27	456	Government Park	②⑥	02:40
②⑥	04:37	466	Daventry	②⑥	02:25
②④	04:53	485	Kiosk	②③	02:00
	06:10	549	North Bay		01:00
②③	06 53	601	Field	②③	00:06
	08 20	683	ar Capreol, Ont.		23:05

Many timetables use a set of symbols to give additional information.
Look for these symbols on the Montreal-Ottawa-Capreol timetable.

- ☐ Daynighter service
 - ☐ Sleeping car service
 - ✂ Snack and beverage service
 - ★ All seats reserved at no extra charge for distances over 400 km
 - ☐ Snacks
- ① No checked baggage
 - ②③ Will stop on request
 - ②④ Regular stop daily except Sun.
Stops Sun. on advanced request
 - ②⑥ Stops on advanced request for revenue passengers to or from North Bay and Ottawa or beyond

The abbreviations ar and dp mean – arrival and departure .

Look at the table for Super Continental 1 and Super Continental 2.
In which direction is each travelling?
What is the departure time for each?
How many kilometres will the Super Continental 1 travel before it makes its first stop? What is the name of the town at which it will stop? How long will it take

the train to travel from North Bay to Capreol? What is the total travelling time from Montreal to Capreol?
A passenger wants to travel from Field, Ontario, to Dorval, Québec. How many kilometres long is the journey? What is the travelling time? Of what special instruction must the passenger be aware?
Make up some questions about this timetable to ask your classmates.



SAMPLE FARES FOR TRAVEL WITH RED-WHITE-BLUE PLAN				ADDITIONAL CHARGE FOR DAYNITER, CLUB AND SLEEPING CAR ACCOMMODATION.						
ONE-WAY RAIL FARES			BETWEEN							
RED	WHITE	BLUE		Dayniter	Club Car	Upper Berth	Lower Berth	Roomette	Mini-Bedroom	Standard Bedroom
			Campbellton, N.B. and							
\$16.00	\$19.00	\$22.50	Lévis, Qué.	\$4.00	—	\$11.00	\$18.00	\$23.00	\$46.00	\$50.00
21.25	25.00	29.25	Montréal, Qué.	4.00	—	12.00	20.00	25.00	50.00	56.00
			Edmonton, Alta. and							
68.00	79.00	93.00	Toronto, Ont.	11.00	—	32.00	53.00	68.00	136.00	148.00
31.00	36.50	43.00	Vancouver, B.C.	5.00	—	14.00	24.00	30.00	60.00	67.00
			Montréal, Qué. and							
69.00	81.00	96.00	Edmonton, Alta.	11.00	—	32.00	53.00	68.00	136.00	148.00
26.50	31.00	36.00	Gaspé, Qué.	—	—	14.00	24.00	30.00	60.00	67.00
26.50	31.00	36.00	Moncton, N.B.	5.00	—	14.00	24.00	30.00	60.00	67.00
6.00	7.00	8.50	Ottawa, Ont.	—	\$ 8.00	—	—	—	—	—
9.00	10.75	12.50	Québec, Qué.	—	11.00	—	—	—	—	—
17.25	20.25	24.00	Toronto, Ont.	4.00	14.00	12.00	15.00	23.00	34.00	34.00
90.00	106.00	124.00	Vancouver, B.C.	13.00	—	38.00	64.00	80.00	160.00	179.00
48.00	57.00	68.00	Winnipeg, Man.	7.00	—	22.00	36.00	45.00	90.00	101.00

- Find the total cost for each of the following trips:
 - a one-way blue fare from Edmonton, Alta., to Toronto, Ont.
 - a return white fare between Montreal, Qué., and Moncton, N.B.
 - a one-way red fare from Campbellton, N.B., to Montréal, Qué., with a lower berth.
 - a return red fare between Montréal, Qué., and Winnipeg, Man., with a roomette each way.
 - a one-way red fare from Edmonton, Alta., to Toronto, Ont., and a one-way blue fare from Toronto to Edmonton.
 - 3 one-way white fares from Montréal, Qué., to Vancouver, B.C., and 3 one-way red fares from Vancouver to Montréal, plus 3 upper berths for each journey.
- A Montreal customer says that he has up to \$500 to spend on rail transportation for his wife and himself. You are a ticket agent. Plan 2 different return journeys for this couple. They want sleeping accommodation.
- Calculate the cost of a return journey from Edmonton, Alta., to Toronto, Ont., using the red fare, the white fare, and the blue fare.
 - How much is saved by travelling on a red fare rather than on a blue fare?
 - How much is saved by travelling on a white fare rather than on a blue fare?
 - How much is saved by travelling on a red fare rather than on a white fare?

Solving a Problem/Research



A class wanted to adopt an orphan in another country. They needed to raise \$50 to support the orphan for 1 a.

The class decided to sell apples at recess in order to raise the money.

Problem

1. How many apples must the class sell in order to make a profit of \$50?
2. Is it possible to sell the required number of apples during one recess?

This is the method the class used to solve its problem. The students asked themselves, "What do we need to know so that we can plan for a profitable sale?" Here are some of the questions they wrote down.

Sales Potential:

Do all children like apples?
 How many students are there at the school?
 Will every student buy an apple?
 How can we find out how many students will buy an apple?
 Will the primary children buy apples?

Profit Potential:

- A. How do we buy a large quantity of apples?

Where can the apples be purchased wholesale?

What are the units used for packaging and selling apples?

What is the cost for each unit?

How many apples are there in each unit?

What is the unit cost for each packaging unit?

- B. How much profit must be made on 1 apple?

- C. What price should be charged for 1 apple?

There are 350 students in the school. The class decided to buy 200 apples. Do you think that was a good decision? Can the class make a profit of \$50 at its sale?

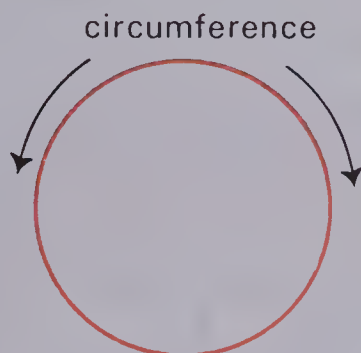
Try this problem for your school.

EXPLORE

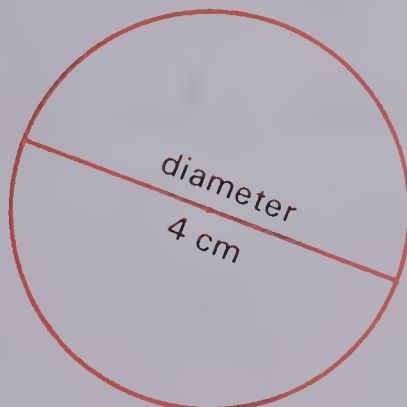
CIRCLES

The **circumference** of a circle or circular object is the distance around it. Where would this information be useful?

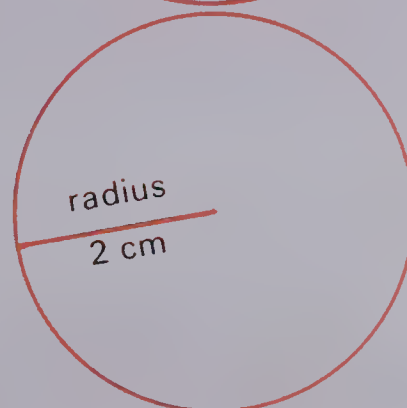
Use string to find the approximate circumference of this circle.



The **diameter** of a circle is a line segment that passes through the centre of the circle and meets the circle at 2 points.



The **radius** of a circle is a line segment that runs from the centre of the circle to a point on the circle.



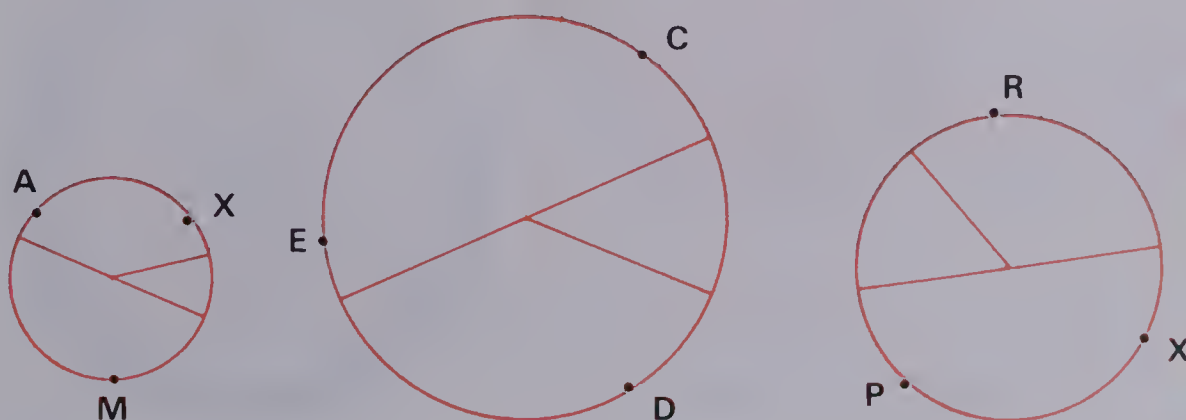
Use string to find the approximate circumference of 3 circular objects.

To draw a diameter, it is necessary to know the **centre** of a circle. Trace and cut out a model of this circle. How can you locate the centre? Draw several diameters. Measure each. What do you discover?

What part of a bicycle wheel might represent a radius?

Measure the diameter and radius of each circle.

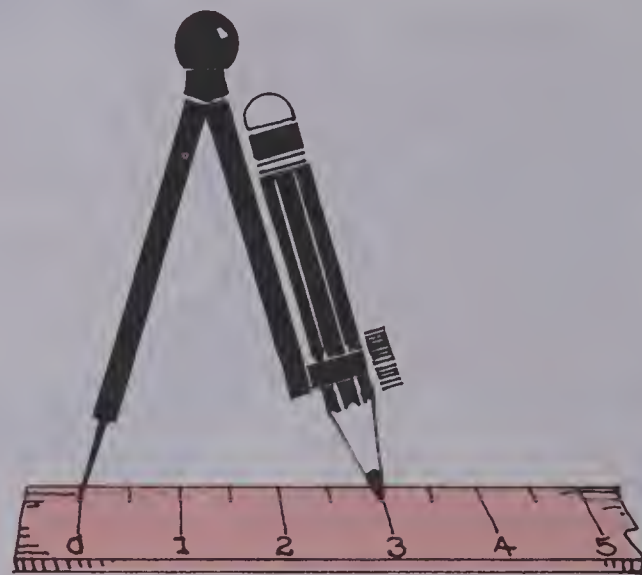
Copy and complete the chart. What relationship do you discover?



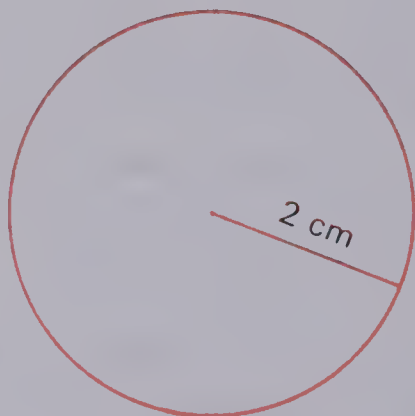
Circle	Length of radius	Length of diameter
AXM		

IN ACTION

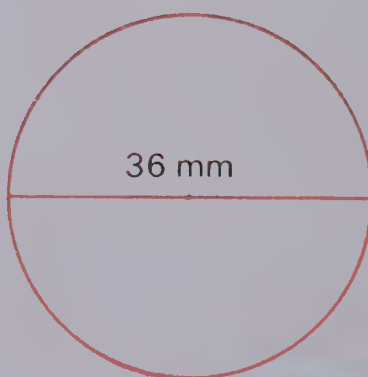
1. a) Spread your compass points 3 cm apart. Check with a ruler. Draw a circle.
b) Draw and name the diameter and the radius. Mark the lengths of each on your diagram.
c) Use a string to measure the circumference.
2. Draw a circle with radius 35 mm. Measure and record the length of the diameter on your diagram.



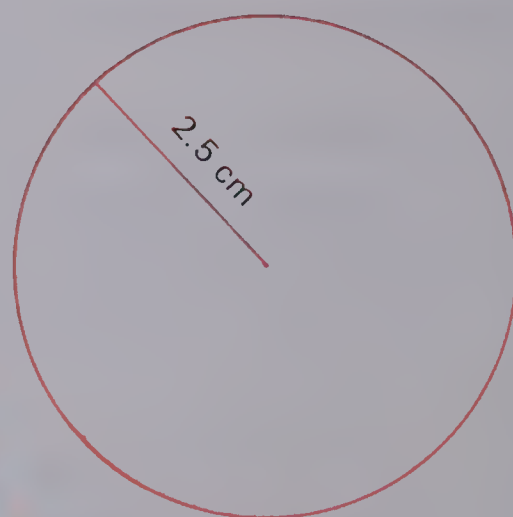
3. a) What is the length of the diameter?



- b) What is the length of the radius?



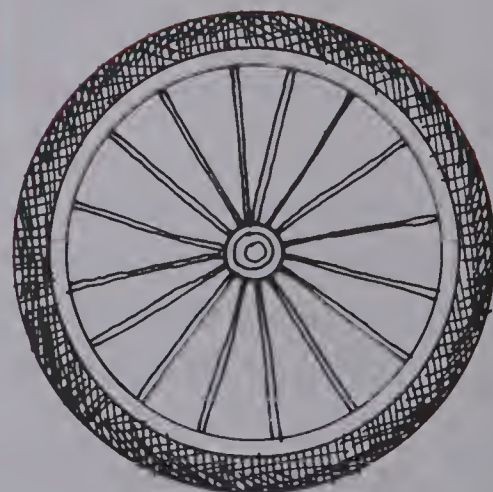
- c) What is the length of the diameter?



4. To be able to measure the diameter of a circular object, one must be able to find the centre of the circle. Devise a method to find the centre of an object such as a dinner plate.



5. a) Measure the diameter and radius of a wheel of a bicycle.
b) Approximately how many turns would your bicycle wheel make in travelling 1 km?





Circle Relations

Obtain 4 cylindrical cans of different sizes.
Make the measurements and calculations to complete the chart.

The distance around the cylinder is the circumference.



AB is the diameter.
OB is the radius.

Cylinder	Diameter d cm	Radius r cm	Circumference c cm	$c + d$	$c - d$	$c \times d$	$c \div d$
1							
2							
3							
4							

What relations are indicated by your results?

Explore the relation between c and d
for each cylinder represented.
Record your results in a chart.

Cylinder		
1	circumference	7.22 cm
	diameter	2.3 cm
2	circumference	27.32 cm
	diameter	8.7 cm
3	circumference	29.21 mm
	diameter	9.3 mm
4	circumference	1.26 m
	diameter	0.4 m

Cylinder	c	d	$c \div d$
1	7.22	2.3	
2	27.32	8.7	
3			
4			

What is your conclusion?

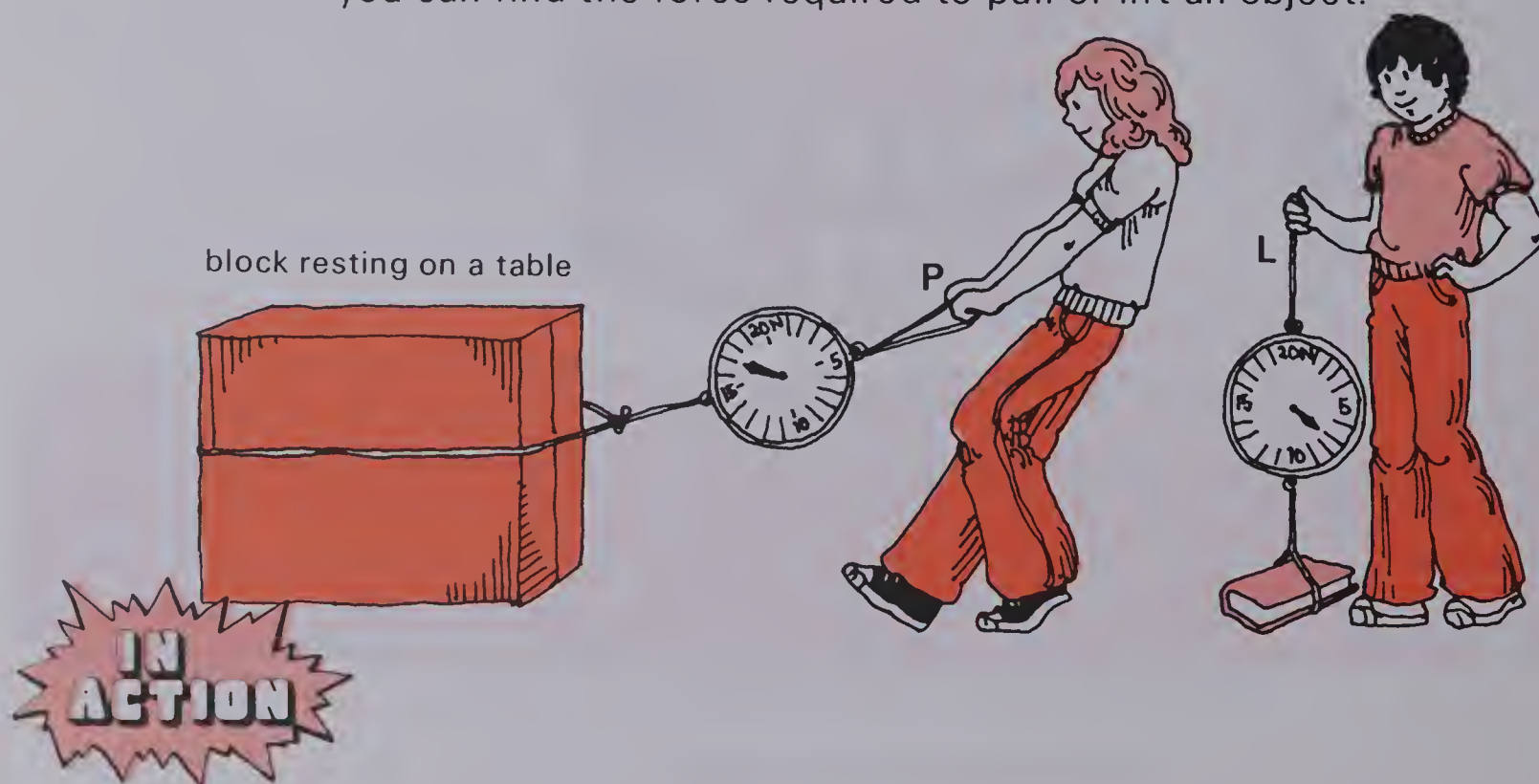
EXPLORE

FORCE/Measuring Force

The force required to move an object is measured in **newtons (N)**.

Attach a scale that reads force in newtons to various objects.

By pulling at point P, or lifting at point L,
you can find the force required to pull or lift an object.



Complete.

Object	Force to lift the object (newtons)	Force to pull the object along a smooth table (newtons)
1 l of water		
wooden block		
shoe		
toy car		
50 g mass		
1 kg mass		
object of your choice		

To get a good concept of a force of 1 N, lift 2 golf balls.

This requires a force of about 1 N.



Calculating Work

You have experimented with finding the force required to lift or pull objects by reading a scale calibrated in newtons.

Now extend your experiment.

Lift or pull the object a distance of 1 m.

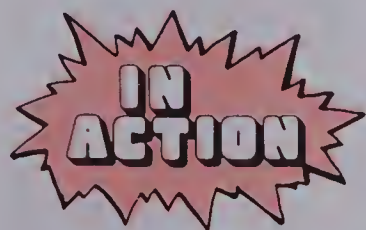
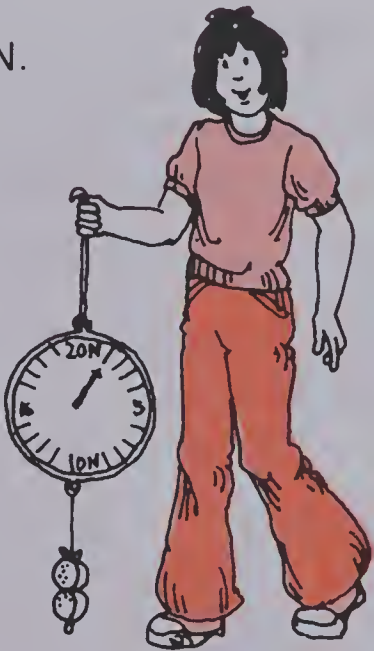
When you lift an object, suppose the scale reads 25 N.

You lift the object 1 m.

The **work** you have done is measured in **joules (J)**.

$$\begin{aligned} \text{work done} &= (25 \times 1) \text{ J} \\ &= 25 \text{ J} \end{aligned}$$

To obtain a good concept of 1 J,
lift 2 golf balls through a height of 1 m.
You have done 1 J of work.



Complete.

Object	Force required to lift or pull the object (newtons)	Distance 1 m	Work done (joules)	Distance 2 m	Work done (joules)
1 l water					
wooden block					
shoe					
toy car					
50 g mass					
1 kg mass					
object of your choice					



Do You Measure Accurately?

Obtain a smooth rectangular prism with mass from 0.5 kg to 1 kg.
You could put sand in a box to obtain a suitable mass.

Measure the length, the width, and the height of the prism.
Calculate the area of each face.
Calculate the volume.

Use a set of balance scales to find the mass.

Attach a scale that reads force in newtons to the prism to find the force required to lift it.
Lift the prism 1 m.

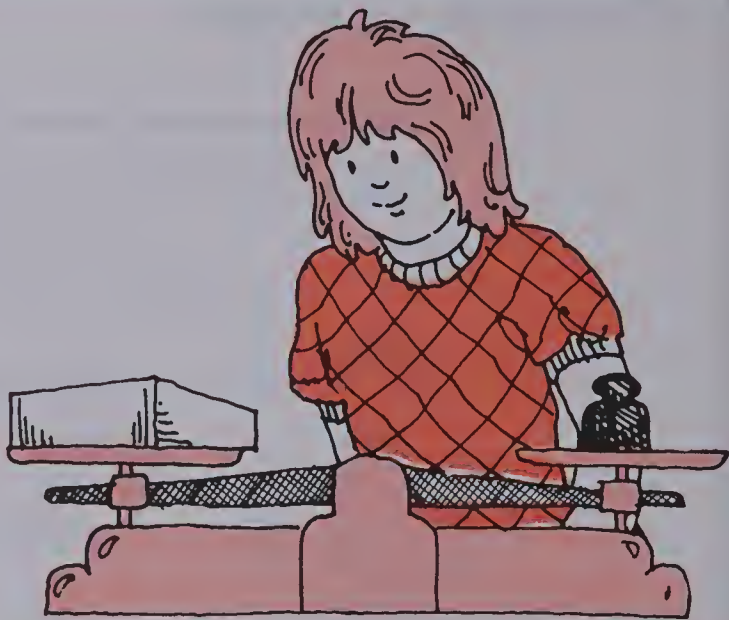
Record your results in a chart.

Length	Width	Height	Area of faces	Volume	Mass	Force to lift the prism
			1			
			2			
			3			
			4			
			5			
			6			

Find the work you did to lift the prism 1 m.

Work done = $(f \times 1)$ J
where f is the force in newtons

How much work is done if you lift the prism 2 m? 10 m?



EXPLORE

GRAPHS/Reading a Circle Graph

The **circle graph** is another way of illustrating a set of data.

$\frac{1}{2}$ of this circle is coloured.

50% of this circle is coloured.

What per cent of the circle is not coloured?

Sharon spent 50% of her free time playing.

She spent another 25% of her free time reading, and another 25% watching TV and listening to music.

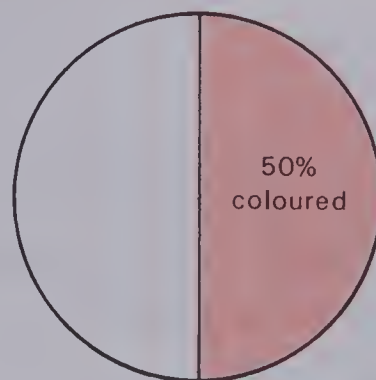
Her circle graph looked like this one.

Sharon has 4 h free time.

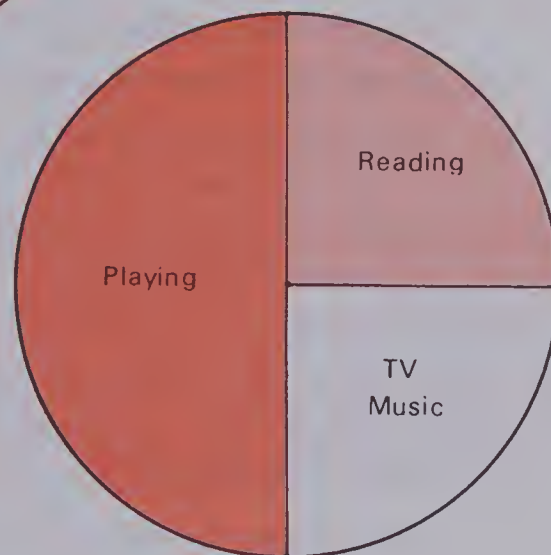
50% of this free time, or 2 h, is spent playing.

How much time is spent reading?

How much time is spent watching TV and listening to music?



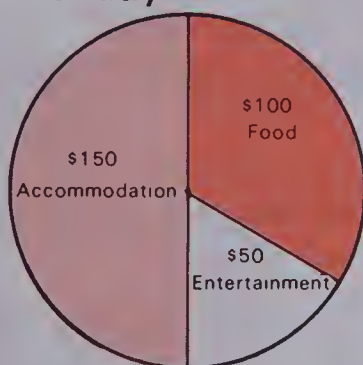
Free-Time Graph



Think
50% of 4 is 2
25% of ? is ?
? of 4 is ?

The circle graph is a good way of showing different types of data.

Cost of a Holiday



Look at the circle graph.

Was the cost for accommodation more or less than for food and entertainment?

What was the total amount spent on the trip?

What per cent of the total cost was accommodation?

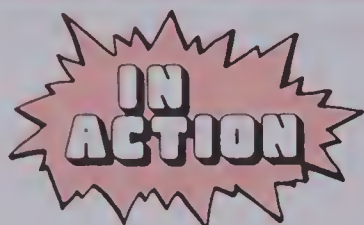
Colour of Students' Eyes



Study the circle graph.

How many students were used in this survey?

What per cent of the total group had blue eyes? brown eyes? gray eyes?



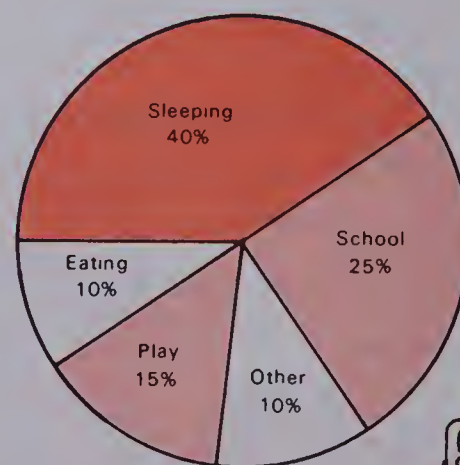
1. A Scout troop had a fund-raising project to earn money for new equipment.
 - a) How much money did the Scout troop make?
 - b) What per cent of the total amount was made at the bake sale?
 - c) What per cent of the total amount was made at the used clothing table?
 - d) What per cent of the total amount was made at the movies?

Funds Raised at Scout Sale



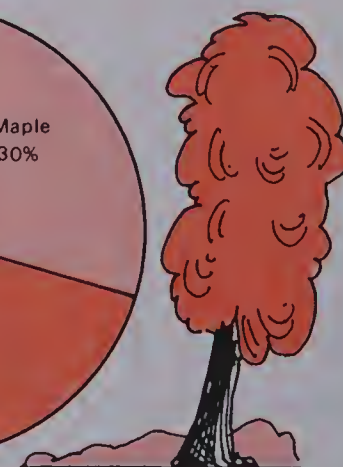
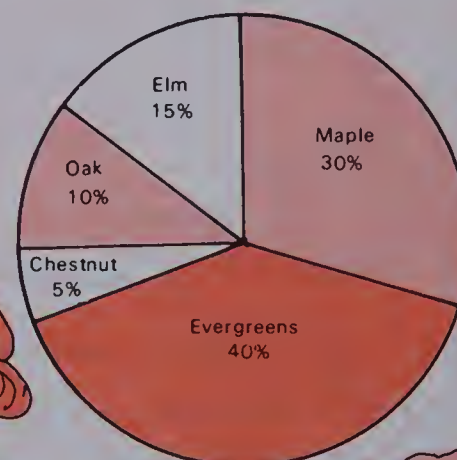
2. Terry made a circle graph to illustrate the per cent of the day spent in each of 5 main activities.
 - a) If 40% of 24 h is spent sleeping, Terry spends 0.40×24 h or ? h sleeping.
 - b) How many hours of the day are spent in school?
 - c) How many hours of the day are spent playing?
 - d) What per cent of the day is spent eating and sleeping? How many hours are spent eating and sleeping?
 - e) If Terry is 10 years old, how many years has he spent eating and sleeping?

A Typical Day



3. A class counted 300 trees in a conservation area.
 - a) How many trees were oaks and evergreens?
 - b) How many trees were maple?
 - c) How many trees were chestnut?
 - d) How many trees were oak?
 - e) Which kind of tree was found in the greatest number?

Conservation Area Trees



The results were:

five 3's

Tim first recorded the data in a table.

Then Tim expressed each result as a per cent of the total number of tosses and recorded these per cents in his table.

Result (others): $\frac{5}{20}$ or 25%

As Result (3) = Result (others),
Tim had to make only 2 calculations.

Result (others): 25% of $360^\circ = 90^\circ$

Finally, Tim constructed and labelled the circle graph.

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1. A science class field trip studied 4 birds: Song thrush, Blackbird, Hedge sparrow and Hawk finch. The class recorded on a chart the number of times each bird was seen.

Bird	Number
Song thrush	75
Blackbird	100
Hedge sparrow	25
Hawk finch	50
Totals	250

- a) What per cent of the total is the number of each kind of bird seen?
Complete the chart.

$$\text{Song thrush: } \frac{75}{250} \times 100 = \frac{7500}{250} = 30$$

$$\text{Blackbird: } \frac{100}{250} \times 100 = \frac{?}{250} = ?$$

Continue for the Hedge sparrow and the Hawk finch.

Bird	Number	Per cent
Song thrush	75	30%
Blackbird	100	
Hedge sparrow	25	
Hawk finch	50	
Totals	250	

- b) Calculate the angles required to illustrate the data.
Complete the chart.

$$\text{Song thrush: } 30\% \text{ of } 360 = 0.30 \times 360 = 108$$

$$\text{Blackbird: } 40\% \text{ of } 360 = 0.40 \times ? = ?$$

Continue for the Hedge sparrow and the Hawk finch.

Bird	Number	Per cent	Angle
Song thrush	75	30%	108°
Blackbird	100		
Hedge sparrow	25		
Hawk finch	50		
Totals	250		

Check:

Is the total of the per cent column 100%?

Is the total of the angle column 360°?

- c) Draw a circle graph to show the data. Name the graph.



Circle Graph/Rounding Off

Your calculations for per cents and angles
will not always work out evenly.

It is sometimes useful to round off a number
to simplify your calculations.

Consider this problem.

There are 3 boys and 6 girls in a group.
Draw a circle graph to illustrate the number of boys
and the number of girls in the group.

1. Draw a chart for the data given.

People	Number in group
boys	3
girls	6
Totals	9

2. Calculate the number of people in
each group as a per cent of the
total group and round off the
answers to the nearest tenth.

boys: $\frac{3}{9} = \frac{3}{9} \times 100$ girls: $\frac{6}{9} = \frac{6}{9} \times 100$
 = 33.3% = 66.6%

People	Number in group	Per cent	Per cent rounded off
boys	3	33.3%	33%
girls	6	66.6%	67%
Totals	9	99.9%	100%

3. Calculate the angles required
to illustrate the data and
round off the angles to the
nearest 1°.

boys: 33% of 360° = 118.8°
girls: 67% of 360° = 241.2°

People	Number in group	Per cent	Per cent rounded off	Angle
boys	3	33.3%	33%	118.8°
girls	6	66.6%	67%	241.2°
Totals	9	99.9%	100%	360.0°

People	Number in group	Per cent	Per cent rounded off	Angle	Angle rounded off
boys	3	33.3%	33%	118.8°	119°
girls	6	66.6%	67%	241.2°	241°
Totals	9	99.9%	100%	360.0°	360°

4. Draw the circle graph.



1. A class of 30 students decided to graph the results of their weekly spelling test.

a) Complete the chart for the test results.

Number of spelling errors	Number of students	Per cent of group	Per cent rounded off	Angle	Angle rounded off
0 errors	20	66.6%	67%	241.2°	241°
1 to 5 errors	6	20%			
more than 5 errors	4	13.3%			
Totals	30	99.9%			

b) Draw and label a circle graph for the above data.

c) Collect data for the results of a spelling test given in your class.

Complete a chart for the test results.

Draw and label a circle graph for the test results.

2. a) Complete the chart for the pulse rates of 30 Grade 6 boys.

Pulse rate beats/min	Number of persons	Per cent	Per cent rounded off	Angle	Angle rounded off
68 to 70	5	16.6%	17%	61.2°	61°
71 to 73	6				
74 to 76	10		33%		
77 to 79	9				108°
Totals					

b) Draw and label a circle graph for the above data.

3. Lorna counted her records.

She had 10 classical records, 32 popular, 5 country-and-western, and 8 musicals.

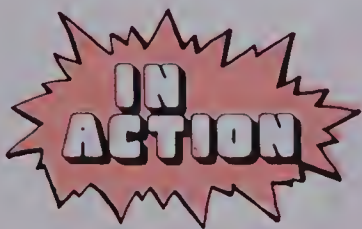
a) Draw and complete a chart for the above data.

b) Draw and label a circle graph that illustrates Lorna's record collection.



Circle Graphs/Bar Graphs

Circle graphs and bar graphs are interesting ways of showing data. At times, one type of graph may be more appropriate to use than the other type. A bar graph shows comparisons among parts of the data. A circle graph relates parts of the data to the total data.



Use a circle graph or bar graph to illustrate each set of data.

1. The table gives the growth rate in grams of a hamster from 12 d of age to 66 d of age.

Age (days)	Mass (g)
12	10
28	30
38	54
48	76
66	100

2. The table lists the estimated flying speeds of 5 birds.

Bird	Estimated speed (km/h)
Albatross	160
Pigeon	92
Raven	38
Willow warbler	20
Swallow	50

3. The table classifies the kinds of days in the life of a student.

Type of days	Number of days	Per cent of total number of days
school days	196	53.6%
weekend days	104	28.4%
special holidays	23	6.3%
summer holidays	42	11.6%

4. All the Grade 6 students were allowed to choose 1 activity for a Wednesday afternoon option program. 33% chose macramé, 30% field trips, 7% orienteering, 17% music appreciation, and 13% modelling.
5. Draw a circle graph to show data that you gather.
6. Draw a bar graph to show data that you gather.



Solving a Problem by a Pattern

Here is a problem that seems difficult
but can be easily solved by using a pattern.



Problem

Some boys have some apples to share.
If each boy is given 3 apples,
one boy will only get 2 apples.

If each boy is given 2 apples, 8 apples
will be left over. How many apples are there?
How many boys are there?

Start a pattern by supposing there are 2 boys.
Find the number of apples for each sharing
as you increase the number of boys.

Number of boys	First sharing	Number of apples	Second sharing	Number of apples
2	$1 \times 3 + 1 \times 2$	5	$2 \times 2 + 8$	12
3	$2 \times 3 + 1 \times 2$	8	$3 \times 2 + 8$	14
4	$3 \times 3 + 1 \times 2$	11	$4 \times 2 + 8$	16
5				
6				

How would you know when you had solved the problem?
Continue the pattern until you solve the problem.
How many apples are there?
How many boys are there?

Further Practice/Unit 1 Place Value and Exponents

1. Draw this place value chart.
Record the following numbers in your chart.

	1 000 000	100 000	10 000	1 000	100	10	1	0.1	0.01	0.001
a)										
b)										

- a) 246 b) 1463.8 c) $5000 + 300 + 20 + 6$ d) 734 069
 e) 0.849 f) 37.69 g) $2 + 0.5 + 0.08 + 0.001$ h) 2.906
 i) 496 321.4 j) 5 980 304 k) $700 + 50 + 0.8 + 0.02$ l) 63 468.2

2. Write the meaning form for

- a) 56 b) 478.2 c) 81.93 d) 8362.8 e) 463 107
 f) 0.493 g) 3 406 123 h) 2.43 i) 17.157 j) 24 362.89

3. Write the expanded form for

- a) 341 b) 56 321 c) 2.5 d) 44.36 e) 500 362
 f) 0.843 g) 3 540 670 h) 5.555 i) 56 300 j) 720.841

4. Write in the power form.

- a) $2 \times 2 \times 2 \times 2$ b) 5×5 c) $7 \times 7 \times 7 \times 7 \times 7$ d) $9 \times 9 \times 9$
 e) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$ f) $10 \times 10 \times 10 \times 10 \times 10$
 g) $8 \times 8 \times 8 \times 8 \times 8 \times 8$ h) $6 \times 6 \times 6 \times 6$
 i) $1 \times 1 \times 1 \times 1 \times 1 \times 1$ j) $4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$

5. Write in the factor form.

- a) 4^3 b) 8^5 c) 2^7 d) 6^4 e) 9^8 f) 7^2 g) 3^9 h) 1^8 i) 10^6 j) 5^{10}

6. Which is greater?

- a) 5^2 or 1^4 b) 3^5 or 4^4 c) 2^8 or 5^3 d) 7^3 or 3^4 e) 4^3 or 9^2

7. Complete.

- a) $4^? = 4 \times 4 \times 4 \times 4$ b) $5 \times 5 \times 5 \times 5 \times 5 = ?$ c) $?^5 = 32$
 d) $10^? = 10 \times 10$ e) $27 = 3^?$ f) $1^{10} = ?$
 g) $7^? = 7 \times 7 \times 7 \times 7$ h) $?^2 = 16$ i) $?^5 = 3 \times 3 \times 3 \times 3 \times 3$
 j) $6^4 = ?$ k) $5^? = 625$ l) $?^3 = 8 \times 8 \times 8$

Addition and Subtraction/Decimals

8. Add.

a) 43 56 81 56 <u>34</u>	b) 19 25 40 81 <u>36</u>	c) 431 356 721 197 <u>503</u>	d) 143 890 357 681 <u>709</u>	e) 1430 4956 852 2300 <u>428</u>	f) 724 491 803 9432 <u>1567</u>	g) 921 28 496 1356 <u>128</u>
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h) 3.4 9.6 8.4 9.0 <u>1.7</u>	i) 0.43 0.87 0.56 0.91 <u>0.27</u>	j) 24.8 36.4 19.7 24.4 <u>81.0</u>	k) 2.36 8.41 5.55 7.08 <u>9.17</u>	l) 1.432 0.486 2.257 1.320 <u>8.465</u>	m) 6.43 18.24 9.07 53.32 <u>0.49</u>	n) 3.412 0.312 0.966 6.380 <u>0.005</u>
---	--	--	--	---	--	---

o) $3.24 + 8.12 + 6.41$
r) $0.03 + 0.07 + 0.08$

p) $146.3 + 138.9 + 152.1$
s) $13.51 + 6.38 + 7.46$

q) $0.4 + 0.03 + 0.132$
t) $1.463 + 4.362 + 0.014$

9. Subtract.

a) 436 <u>124</u>	b) 589 <u>436</u>	c) 907 <u>504</u>	d) 4965 <u>3564</u>	e) 8306 <u>7205</u>	f) 1937 <u>926</u>
g) 3496 <u>1587</u>	h) 9643 <u>8537</u>	i) 6037 <u>2726</u>	j) 1537 <u>649</u>	k) 3809 <u>1779</u>	l) 4700 <u>2564</u>
m) 13.46 <u>8.32</u>	n) 143.7 <u>82.5</u>	o) 9.608 <u>8.347</u>	p) 73.84 <u>31.94</u>	q) 1.496 <u>0.834</u>	r) 2.640 <u>2.562</u>
s) 4.060 <u>1.964</u>	t) 943.0 <u>82.9</u>	u) 53.813 <u>6.437</u>	v) 736.24 <u>194.06</u>	w) 5364.3 <u>2460.9</u>	x) 11.000 <u>0.999</u>

10. Complete.

a) $43.61 - 34.21 = ?$
d) $4962 - 3271 = ?$
g) $14.36 + 1.346 = ?$
j) $1.946 - 0.042 = ?$

b) $156.3 + 94.7 = ?$
e) $0.478 - 0.299 = ?$
h) $0.964 - 0.365 = ?$
k) $1847 + 0.438 = ?$

c) $3.871 + 1.406 = ?$
f) $1876 + 954 = ?$
i) $1567.4 + 6.34 = ?$
l) $24.36 - 19 = ?$

Word Problems, Multiplying and Dividing by 1, 10, 100, 1000

11. A volunteer group made 1437 visits in January and 937 visits in February. How many more visits did it make in January than in February?
12. A radio station distributed 15 046 advertising buttons the first week, 8362 the second week, and 9328 the third week. How many buttons did it distribute in 3 weeks?
13. In 6 d Martin spent 270 min delivering papers and 180 min collecting his money. a) How many minutes did Martin spend on his paper route in the 6 d?
b) How many more minutes did he spend delivering than collecting?
14. For a book sale, the Girl Guides collected 237 books the first week and 318 books the second week. How many more books did they collect in the second week than in the first week?
15. Complete.

a) $8 \times 10 = ?$	b) $9 \times 100 = ?$	c) $34 \times 10 = ?$	d) $19 \times 100 = ?$
e) $0.1 \times 10 = ?$	f) $0.3 \times 100 = ?$	g) $4.2 \times 10 = ?$	h) $8.9 \times 100 = ?$
i) $0.47 \times 10 = ?$	j) $0.16 \times 100 = ?$	k) $3.25 \times 10 = ?$	l) $7.05 \times 100 = ?$
m) $47.62 \times 10 = ?$	n) $28.07 \times 100 = ?$	o) $54.12 \times 10 = ?$	p) $99.08 \times 100 = ?$
16. Complete

a) $1241 \div 10 = ?$	b) $3605 \div 100 = ?$	c) $563 \div 10 = ?$	d) $341 \div 100 = ?$
e) $204.1 \div 10 = ?$	f) $1100 \div 100 = ?$	g) $352.3 \div 10 = ?$	h) $978.0 \div 100 = ?$
i) $24 \div 10 = ?$	j) $53 \div 100 = ?$	k) $8 \div 10 = ?$	l) $5 \div 100 = ?$
m) $37.2 \div 10 = ?$	n) $85.0 \div 100 = ?$	o) $9.6 \div 10 = ?$	p) $160 \div 100 = ?$
17. Complete.

a) $8 \div 10 = ?$	b) $30 \times 100 = ?$	c) $42 \times 1 = ?$	d) $5630 \div 1000 = ?$
e) $8341 \times 100 = ?$	f) $58 \div 1 = ?$	g) $240 \div 1000 = ?$	h) $97 \div 10 = ?$
i) $852 \times 10 = ?$	j) $0.34 \times 1000 = ?$	k) $0.8 \div 1 = ?$	l) $0.46 \times 10 = ?$
m) $0.02 \div 1 = ?$	n) $4.36 \times 1 = ?$	o) $9000 \div 1000 = ?$	p) $0.58 \times 1000 = ?$
18. A pile of cardboard sheets is 45 cm high. If 10 sheets are 1 cm high, how many sheets of cardboard are there in the pile?
19. Jim used a trundle wheel to find the distance around a flower bed. The distance was 100 m. The trundle wheel made 100 complete turns. What is the distance covered in 1 turn?

Length, Perimeter, and Multiplication

20. Estimate, then measure each line segment in millimetres.

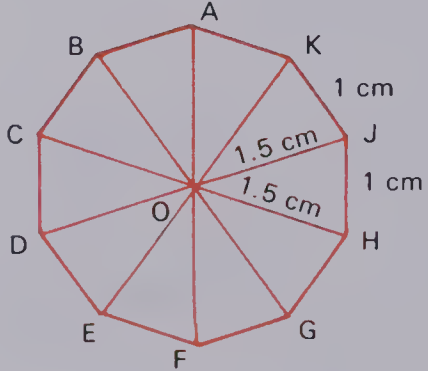
a)  b)  c)  d)  e) 

21. Estimate, then measure each line segment in centimetres.

a)  b)  c)  d)  e) 

22. The distance from St. John's, Newfoundland, to Calgary, Alberta, is approximately 4000 km.

- a) James Bay is halfway between Calgary and St. John's.
How many kilometres is it from James Bay to Calgary?
b) If a driver takes 10 d to drive from St. John's to Calgary, and travels the same distance each day, how many kilometres does he drive in 1 d?

23.  a) What is the perimeter of this decagon?
b) What is the perimeter of $\triangle FOG$?
c) What is the perimeter of the polygon AOHJK?
d) What is the perimeter of the polygon COED?
e) What is the sum of the perimeters of $\triangle COD$ and $\triangle DOE$?

24. Calculate the perimeter of:

- a) a triangle 9 cm by 9 cm by 8 cm
b) a pentagon 2.4 cm by 8 cm by 3 cm by 6.5 cm by 4 cm
c) a rectangle 12.5 cm by 10 cm.

25. Find the product. Check by estimating.

- | | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| a) 422×9 | b) 859×3 | c) 612×7 | d) 297×5 | e) 921×6 |
| f) 1936×8 | g) 5622×2 | h) 7005×9 | i) 4871×6 | j) 8902×4 |
| k) 243×0.9 | l) 356×0.2 | m) 594×0.7 | n) 390×0.4 | o) 704×0.8 |
| p) 5970×0.7 | q) 1131×0.8 | r) 2485×0.2 | s) 3905×0.5 | t) 6112×0.9 |

26. Multiply.

- | | | | | | | |
|--|---|--|--|---|---|---|
| a) $\begin{array}{r} 24.6 \\ \times 7 \\ \hline \end{array}$ | b) $\begin{array}{r} 480 \\ \times 0.3 \\ \hline \end{array}$ | c) $\begin{array}{r} 961 \\ \times 0.7 \\ \hline \end{array}$ | d) $\begin{array}{r} 35.2 \\ \times 9 \\ \hline \end{array}$ | e) $\begin{array}{r} 2.31 \\ \times 4 \\ \hline \end{array}$ | f) $\begin{array}{r} 81.2 \\ \times 0.3 \\ \hline \end{array}$ | g) $\begin{array}{r} 8.06 \\ \times 5 \\ \hline \end{array}$ |
| h) $\begin{array}{r} 31.5 \\ \times 0.3 \\ \hline \end{array}$ | i) $\begin{array}{r} 24.11 \\ \times 9 \\ \hline \end{array}$ | j) $\begin{array}{r} 8.36 \\ \times 0.4 \\ \hline \end{array}$ | k) $\begin{array}{r} 53.6 \\ \times 0.8 \\ \hline \end{array}$ | l) $\begin{array}{r} 40.09 \\ \times 0.4 \\ \hline \end{array}$ | m) $\begin{array}{r} 91.24 \\ \times 0.6 \\ \hline \end{array}$ | n) $\begin{array}{r} 50.09 \\ \times 0.7 \\ \hline \end{array}$ |

Multiplication, Angles, and Letter Symbols

27. Multiply.

- a) 24
16

b) 83
56

c) 91
38

d) 21
47

e) 78
81

f) 54
37

g) 63
58

h) 71
49
- i) 5.2
20

j) 93
3.7

k) 58
6.2

l) 7.1
4.9

m) 3.2
5.7

n) 64
4.5

o) 8.3
5.3

p) 99
0.48
- q) 0.31
24

r) 0.91
38

s) 0.64
5.2

t) 97
0.64

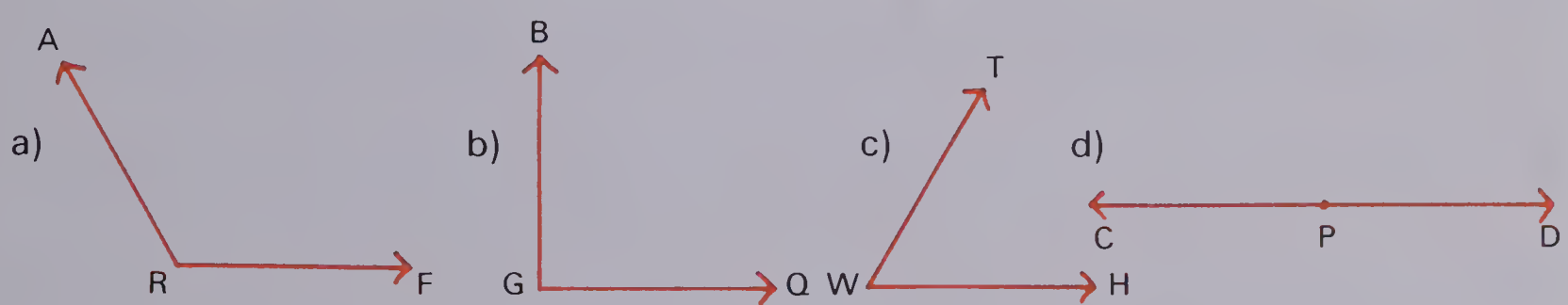
u) 7.7
0.36

v) 5.9
0.65

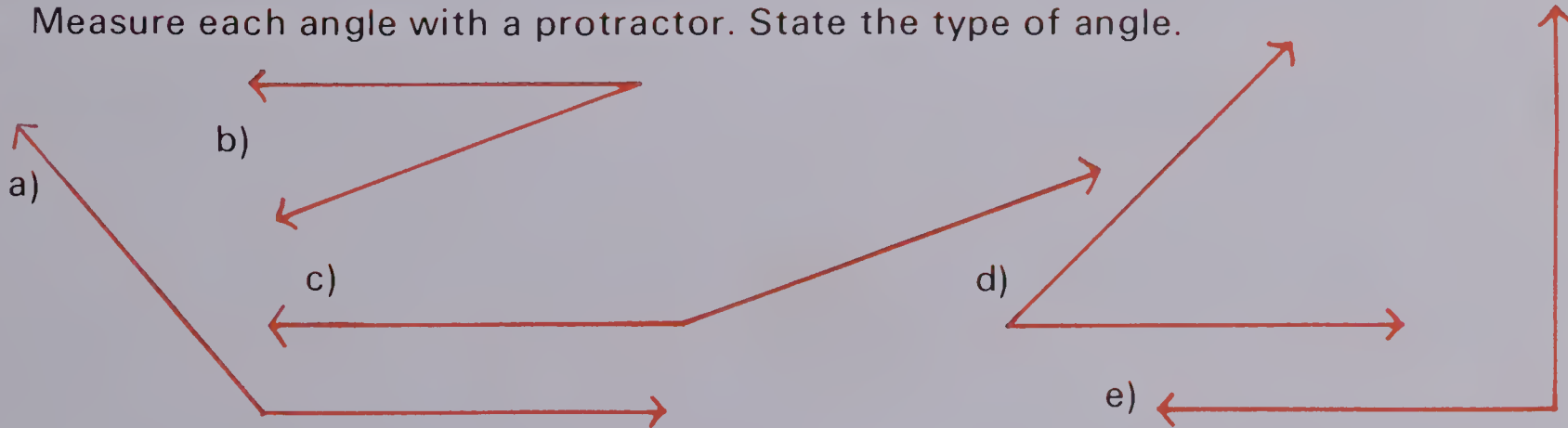
w) 0.4
0.68

x) 0.7
0.96

28. For each angle, name the rays, the common end point, and the type of angle.



29. Measure each angle with a protractor. State the type of angle.



30. Solve.

- a) $k + 6 = 30$

b) $r - 6 = 21$

c) $3 \times w = 27$

d) $n - 5 = 40$

e) $10 \times q = 50$
- f) $c + 10 = 20$

g) $e \times 7 = 56$

h) $y - 12 = 24$

i) $j \times 7 = 63$

j) $m - 7 = 32$

31. Complete the chart.

n	$2 \times n$	$2 \times n + 1$	$2 \times n - 1$	$3 \times n$	$4 \times n + 2$	$5 \times n - 1$
3	6				14	
5			9			
2					10	

Word Problems

32. What number added to $19 - 4$ will give 23?
33. Add 15 to a number and the sum is 47. What is the number?
34. Subtract 13 from a number and the difference is 27. What is the number?
35. What number is 3 times the sum of 6 and 5?
36. What number is 7 times the difference between 13 and 4?
37. What number is 5 more than the sum of 17 and 13?
38. What number is 12 less than the sum of 22 and 8?
39. What number is 8 more than the difference between 16 and 9?
40. What number is 11 less than the difference between 43 and 18?
41. What number added to the sum of 14 and 7 will give 33?
42. How many times will 4 times 3 divide into 48 evenly?
43. What number added to $53 - 48$ will give 20?
44. Add 22 to a number and the sum is 54.
What is the number?
45. Subtract 21 from a number and the difference is 61. What is the number?
46. What number is 8 times the sum of 8 and 3?
47. What number is 9 times the difference between 47 and 39?
48. What number is 8 more than the sum of 31 and 58?
49. What number is 19 less than the sum of 77 and 39?
50. Write the next 5 multiples of 7 greater than 38.
51. Write the next 5 multiples of 9 greater than 53.
52. Continue the pattern for 4 more entries.
56, 64, 72, ?, ?, ?, ?
53. Continue the pattern for 4 more entries.
84, 99, 114, ?, ?, ?, ?

Answers to Further Practice/Unit 1

1.

	1 000 000	100 000	10 000	1 000	100	10	1	0.1	0.01	0.001
a)					2	4	6			
b)				1	4	6	3	8		
c)				5	3	2	6			
d)		7	3	4	0	6	9			
e)							0	8	4	9
f)						3	7	6	9	
g)							2	5	8	1
h)							2	9	0	6
i)		4	9	6	3	2	1	4		
j)	5	9	8	0	3	0	4			
k)					7	5	0	8	2	
l)			6	3	4	6	8	2		

2. a) 5 tens and 6 b) 4 hundreds, 7 tens, 8 ones, and 2 tenths
 c) 8 tens, 1 one, 9 tenths, and 3 hundredths
 d) 8 thousands, 3 hundreds, 6 tens, 2 ones, and 8 tenths
 e) 4 hundred thousands, 6 ten thousands, 3 thousands, 1 hundred, and 7
 f) 4 tenths, 9 hundredths, and 3 thousandths
 g) 3 millions, 4 hundred thousands, 6 thousands, 1 hundred, 2 tens, and 3
 h) 2 ones, 4 tenths, and 3 hundredths i) 1 ten, 7 ones, 1 tenth, 5 hundredths, and 7 thousandths
 j) 2 ten thousands, 4 thousands, 3 hundreds, 6 tens, 2 ones, 8 tenths, and 9 hundredths
3. a) $300 + 40 + 1$ b) $50\,000 + 6000 + 300 + 20 + 1$ c) $2 + 0.5$ d) $40 + 4 + 0.3 + 0.06$
 e) $500\,000 + 300 + 60 + 2$ f) $0.8 + 0.04 + 0.003$ g) $3\,000\,000 + 500\,000 + 40\,000 + 600 + 70$
 h) $5 + 0.5 + 0.05 + 0.005$ i) $50\,000 + 6000 + 300$ j) $700 + 20 + 0.8 + 0.04 + 0.001$
4. a) 2^4 b) 5^2 c) 7^5 d) 9^3 e) 3^7 f) 10^5 g) 8^6 h) 6^4 i) 1^6 j) 4^{10}
5. a) $4 \times 4 \times 4$ b) $8 \times 8 \times 8 \times 8 \times 8$ c) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 d) $6 \times 6 \times 6 \times 6$ e) $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$ f) 7×7
 g) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$ h) $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1$
 i) $10 \times 10 \times 10 \times 10 \times 10 \times 10$ j) $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$
6. a) 5^2 b) 4^4 c) 2^8 d) 7^3 e) 9^2
7. a) 4^4 b) 5^5 c) 2^5 d) 10^2 e) 3^3 f) $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1$ or 1
 g) 7^4 h) 4^2 i) 3^5 j) $6 \times 6 \times 6 \times 6$ or 1296 k) 5^4 l) 8^3
8. a) 270 b) 201 c) 2208 d) 2780 e) 9966 f) 13 017 g) 2929
 h) 32.1 i) 3.04 j) 186.3 k) 32.57 l) 13.960 m) 87.55 n) 11.075
 o) 17.77 p) 437.3 q) 0.562 r) 0.18 s) 27.35 t) 5.839

9. a) 312 b) 153 c) 403 d) 1401 e) 1101 f) 1011 g) 1909 h) 1106
i) 3311 j) 888 k) 2030 l) 2136 m) 5.14 n) 61.2 o) 1.261 p) 41.90
q) 0.662 r) 0.078 s) 2.096 t) 860.1 u) 47.376 v) 542.18 w) 2903.4 x) 10.001
10. a) 9.40 b) 251.0 c) 5.277 d) 1691 e) 0.179 f) 2830
g) 15.706 h) 0.599 i) 1573.74 j) 1.904 k) 1847.438 l) 5.36
11. 500 12. 32 736 13. a) 450 min b) 90 min 14. 81
15. a) 80 b) 900 c) 340 d) 1900 e) 1 f) 30 g) 42 h) 890
i) 4.7 j) 16 k) 32.5 l) 705 m) 476.2 n) 2807 o) 541.2 p) 9908
16. a) 124.1 b) 36.05 c) 56.3 d) 3.41 e) 20.41 f) 11 g) 35.23 h) 9.78
i) 2.4 j) 0.53 k) 0.8 l) 0.05 m) 3.72 n) 0.85 o) 0.96 p) 1.6
17. a) 0.8 b) 3000 c) 42 d) 5.63 e) 834 100 f) 58 g) 0.24 h) 9.7
i) 8520 j) 340 k) 0.8 l) 4.6 m) 0.02 n) 4.36 o) 9 p) 580
18. 450 19. 1 m 20. a) 5 mm b) 20 mm c) 15 mm d) 30 mm e) 60 mm
21. a) 2 cm b) 4 cm c) 1 cm d) 6 cm e) 8 cm 22. a) 2000 km b) 400 km
23. a) 10 cm b) 4 cm c) 6 cm d) 5 cm e) 8 cm 24. a) 26 cm b) 23.9 cm c) 45 cm
25. a) 3798 b) 2577 c) 4284 d) 1485 e) 5526 f) 15 488 g) 11 244
h) 63 045 i) 29 226 j) 35 608 k) 218.7 l) 71.2 m) 415.8 n) 156.0
o) 563.2 p) 4179.0 q) 904.8 r) 497.0 s) 1952.5 t) 5500.8
26. a) 172.2 b) 144.0 c) 672.7 d) 316.8 e) 9.24 f) 24.36 g) 40.30
h) 9.45 i) 216.99 j) 3.344 k) 42.88 l) 16.036 m) 54.744 n) 35.063
27. a) 384 b) 4648 c) 3458 d) 987 e) 6318 f) 1998 g) 3654 h) 3479
i) 104.0 j) 344.1 k) 359.6 l) 34.79 m) 18.24 n) 288.0 o) 43.99 p) 47.52
q) 7.44 r) 34.58 s) 3.328 t) 62.08 u) 2.772 v) 3.835 w) 0.272 x) 0.672
28. a) AR, RF; R; obtuse angle b) BG, GQ; G; right angle
c) TW, WH; W; acute angle d) CP, PD; P; straight angle
29. a) 130° ; obtuse angle b) 20° ; acute angle c) 160° ; obtuse angle
d) 45° ; acute angle e) 90° ; right angle
30. a) $k = 24$ b) $r = 27$ c) $w = 9$ d) $n = 45$ e) $q = 5$
f) $c = 10$ g) $e = 8$ h) $y = 36$ i) $j = 9$ j) $m = 39$
31.

n	$2 \times n$	$2 \times n + 1$	$2 \times n - 1$	$3 \times n$	$4 \times n + 2$	$5 \times n - 1$
3	6	7	5	9	14	14
5	10	11	9	15	22	24
2	4	5	3	6	10	9
32. 8 33. 32 34. 40
35. 33 36. 63 37. 35
38. 18 39. 15 40. 14
41. 12 42. 4 43. 15
44. 32 45. 82 46. 88
47. 72 48. 97 49. 97
50. 45, 52, 59, 66, 73 51. 62, 71, 80, 89, 98 52. 80, 88, 96, 104 53. 129, 144, 159, 174

Further Practice/Unit 2 Even and Odd Numbers, Division

1.
 - a) Add 2 even numbers. Is the sum even or odd? Repeat this for other pairs of even numbers. What is your conclusion?
 - b) Add 2 odd numbers. Is the sum even or odd? Repeat this for other pairs of odd numbers. What is your conclusion?
 - c) Add an even and an odd number. Is the sum even or odd? Repeat this for other examples. What is your conclusion?
2. Repeat the procedure in Question 1 for subtraction.
3. Repeat the procedure in Question 1 for multiplication.
4. Divide.
 - a) 168 by 12 b) 208 by 13 c) 189 by 21 d) 306 by 18 e) 209 by 11
 - f) 408 by 12 g) 513 by 19 h) 270 by 18 i) 551 by 29 j) 782 by 23
5. A carton contains 750 nails. There are 15 nails to a package. How many packages are there in a carton?
6. A small boat carried 420 passengers to an island in 1 d. It can carry 12 passengers each trip. How many trips did it make?
7. A box contains 3600 spokes for bicycle wheels. If there are 36 spokes in 1 wheel, how many wheels can be made?
8. The total distance travelled by 18 commuter trains going one way between Toronto and Oakville is 612 km. What is the distance in kilometres between Toronto and Oakville?
9. The total time taken by the 18 commuter trains travelling from Oakville to Toronto was 468 min. What is the time in minutes for 1 train to travel from Oakville to Toronto?
10. Divide 1248 by 13.
Divide this quotient by 12.
Divide this quotient by 8.
What is the final quotient?
11. Divide 1320 by 11.
Divide this quotient by 12.
Divide this quotient by 10.
What is the final quotient?

Division and Rounding Off

12. Divide.

- a) 43.7 by 19 b) 54.0 by 12 c) 52.7 by 17 d) 23.1 by 21 e) 68.4 by 36
f) 72.8 by 13 g) 111.0 by 15 h) 87.4 by 23 i) 130.2 by 21 j) 98.6 by 34

13. Divide.

- a) 24.48 by 18 b) 28.92 by 12 c) 28.35 by 15 d) 27.88 by 17 e) 24.25 by 25
f) 26.66 by 31 g) 42.84 by 14 h) 53.56 by 13 i) 32.19 by 29 j) 35.52 by 16

14. Divide.

- a) 2532 by 12 b) 64.8 by 18 c) 18.98 by 13 d) 2016 by 21 e) 35.31 by 11
f) 16.94 by 14 g) 0.544 by 17 h) 0.169 by 13 i) 0.378 by 18 j) 966 by 23

15. Round each number to the nearest tenth.

- a) 4.67 b) 9.12 c) 13.37 d) 210.51 e) 0.68 f) 0.12
g) 18.99 h) 1.89 i) 0.79 j) 15.01 k) 5.08 l) 0.07
m) 1.437 n) 5.621 o) 0.178 p) 3.083 q) 7.023 r) 15.008

16. Divide. Express the quotient to the nearest tenth.

- a) 214 by 12 b) 346 by 15 c) 513 by 21 d) 487 by 19 e) 343 by 14
f) 411 by 17 g) 524 by 23 h) 233 by 15 i) 189 by 11 j) 287 by 17
k) 355 by 22 l) 462 by 25 m) 527 by 29 n) 399 by 16 o) 296 by 18

17. Divide. Express the quotient to the nearest tenth.

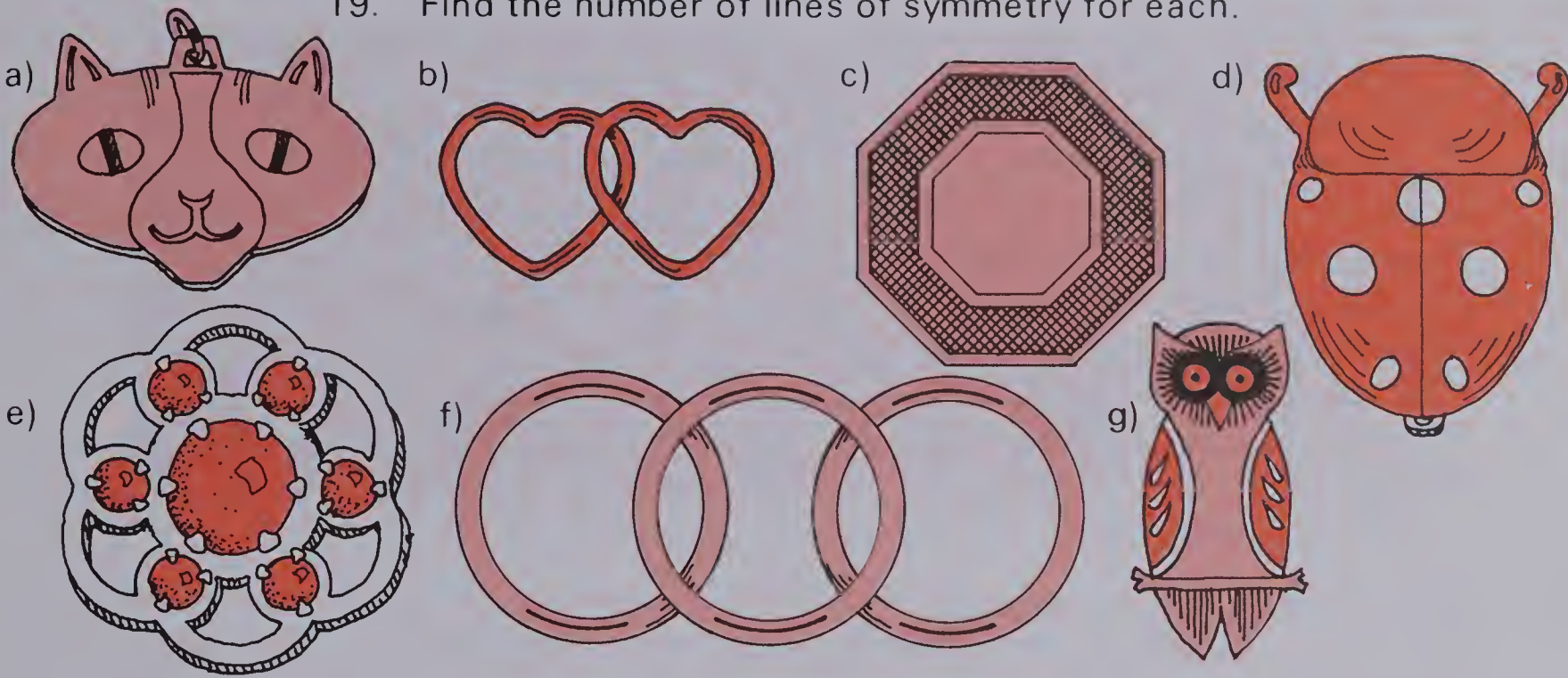
- a) 4.12 by 13 b) 8.96 by 17 c) 3.23 by 16 d) 21.45 by 11 e) 29.64 by 19
f) 74.3 by 24 g) 51.6 by 27 h) 4.6 by 18 i) 6.3 by 15 j) 22.3 by 12
k) 0.52 by 14 l) 0.67 by 23 m) 0.86 by 31 n) 6.24 by 22 o) 90.31 by 27

18. Find the unit cost.

- | | |
|---|--|
| a) 8 bananas cost \$1.20
1 banana costs ? | b) 15 postcards cost \$1.50
1 postcard costs ? |
| c) 12 air mail stamps cost \$2.40
1 air mail stamp costs ? | d) 35 school hats cost \$66.15
1 school hat costs ? |

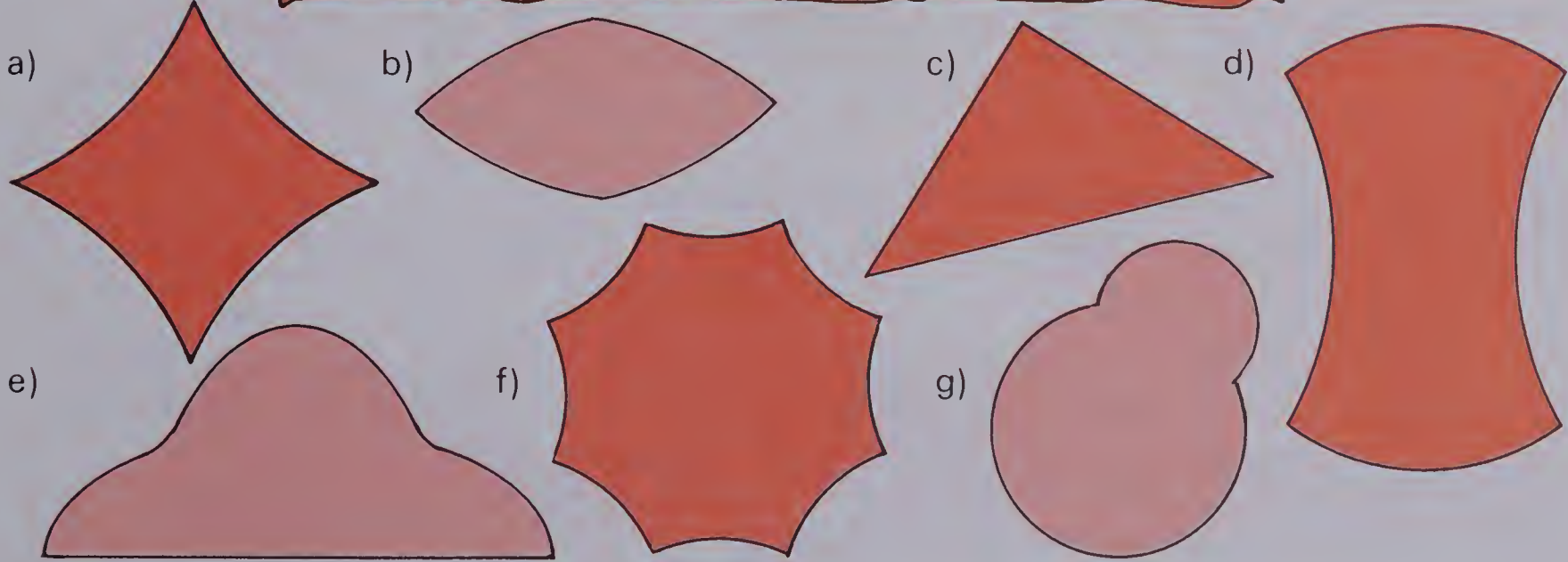
Symmetry

19. Find the number of lines of symmetry for each.



20. Copy and complete the chart.
Use tracing paper to check each shape.

Shape	Rotational symmetry	No rotational symmetry	Order of rotational symmetry
a)			
b)			



Factors

21. Complete the chart.

	Number	Indicated product	Factors	Number of factors
a)	3	1×3	1, 3	
b)	8	$1 \times 8, 2 \times 4$		
c)	14			
d)	17			
e)	22			
f)	38			
g)	27			
h)	36			

22. List the factors of a) 12 b) 30 c) 32 d) 45 e) 70 f) 88

23. What is the composite number?

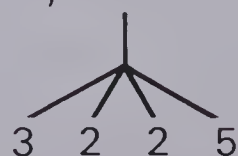
a) $c = ?$



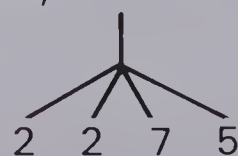
b) $c = ?$



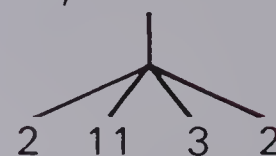
c) $c = ?$



d) $c = ?$



e) $c = ?$



24. Find the prime factorization of each composite number.

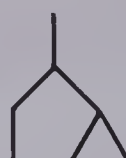
a) 25



b) 30



c) 42



d) 54



e) 32



25. Find the prime factorization of each composite number.

a) 40

b) 35

c) 28

d) 76

e) 85

f) 112

g) 240

26. Find the GCF of

a) 4, 6

b) 10, 8

c) 5, 15

d) 20, 6

e) 7, 21

f) 24, 30

g) 42, 60

h) 45, 60

i) 36, 54

j) 21, 105

k) 27, 63

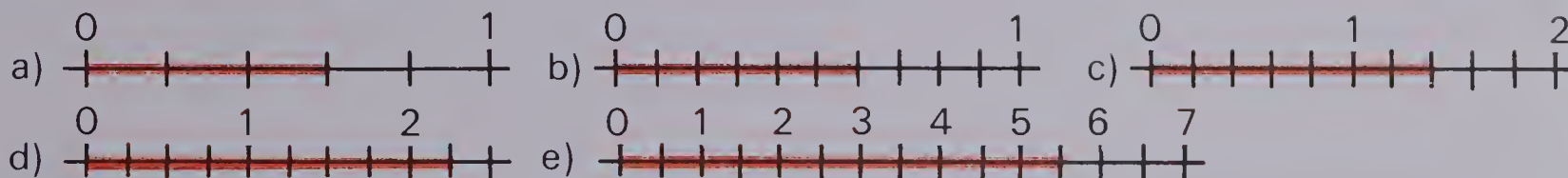
l) 42, 70

27. List the first 10 prime numbers.

28. List the prime numbers between 25 and 35.

Fractions, 24-Hour Clock, Scale

29. Write the fraction that shows what part is shaded.



30. Complete.

a) $\frac{5}{10} = \frac{?}{100}$ b) $\frac{4}{10} = \frac{40}{?}$ c) $\frac{3}{2} = \frac{?}{10}$ d) $\frac{2}{4} = \frac{?}{100}$
 e) $\frac{12}{8} = \frac{6}{?}$ f) $\frac{5}{?} = \frac{20}{8}$ g) $\frac{150}{100} = \frac{3}{?}$ h) $\frac{11}{?} = \frac{110}{100}$

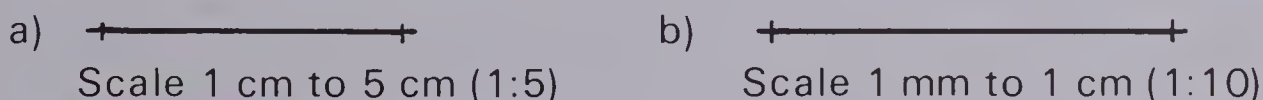
31. Write the least-terms fraction for each.

a) $\frac{30}{100}$ b) $\frac{40}{8}$ c) $\frac{3}{4}$ d) $\frac{14}{8}$ e) $\frac{33}{10}$ f) $\frac{60}{100}$ g) $\frac{120}{100}$

32. Write the following times using the 24-hour clock.

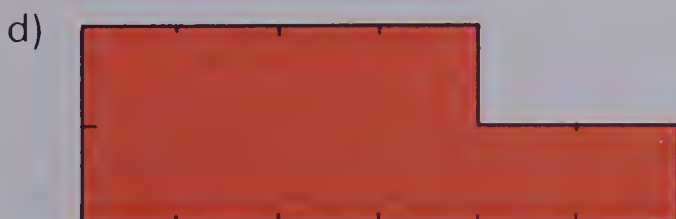
- a) every 6 h from midnight one day to midnight the following day
 b) every 15 min from 02:00 to 03:00 c) every 6 min from 14:11 to 14:38

33. Find the actual measurements.



34. Calculate the area of:

- a) a rectangle 3 cm by 8 cm
 b) a square with sides of 4.5 cm
 c) a rectangle 6.5 cm by 2.6 cm



Word Problems

35. What is the least number that can be added to 59 to make it divisible by 9?
36. What is the least number that can be added to 81 to make it divisible by 8?
37. Pete had 71 hockey cards. He gained 12 and lost 9. How many does he have now?
38. Marion won 104 points in a game. On her next move she gained 14 points, and then she lost 21. How many points does she have now?
39. Edith left for school at 08:30. She returned home 3 h later. At what time did she return?
40. Alexis played baseball from 19:00 to 20:35. How long did he play baseball?
41. Cheese costs \$2.70/kg. How much will 0.5 kg cost?
42. 1 m of material for a skirt costs \$4.50. How much will 1.5 m of material cost?
43. 57 children sign up to play baseball. How many teams of 9 players can be chosen?
44. Alvin answered 0.25 of the questions. He answered 7 questions. How many questions were asked?
45. Valerie completed 0.75 of her workbook. She has 20 pages to complete. How many pages are in the book?
46. What number is four times $\frac{1}{2}$ of 6?
47. Tom is $\frac{1}{2}$ as old as Doris. Doris was 12 two years ago. How old is Tom?
48. What number is twice $\frac{1}{5}$ of 20?
49. What number is 5 times $\frac{1}{10}$ of 20?
50. A car travels 20 km/h. How far will it travel in 5 h?
51. What number is 4 times $\frac{1}{5}$ of 15?
52. A train travels 60 km/h. How far will it travel in 15 min?

Answers to Further Practice/Unit 2

1. a) even; the sum of any pair of even numbers is always even.
b) even; the sum of any pair of odd numbers is always even.
c) odd; the sum of any pair of even and odd numbers is always odd.
2. a) even; the difference between any pair of even numbers is always even.
b) even; the difference between any pair of odd numbers is always even.
c) odd; the difference between any pair of even and odd numbers is always odd.
3. a) even; the product of any pair of even numbers is always even.
b) odd; the product of any pair of odd numbers is always odd.
c) even; the product of any pair of even and odd numbers is always even.
4. a) 14 b) 16 c) 9 d) 17 e) 19 f) 34 g) 27 h) 15 i) 19 j) 34
5. 50 6. 35 7. 100 8. 34 km 9. 26 min 10. 96; 8; 1 11. 120; 10; 1
12. a) 2.3 b) 4.5 c) 3.1 d) 1.1 e) 1.9
f) 5.6 g) 7.4 h) 3.8 i) 6.2 j) 2.9
13. a) 1.36 b) 2.41 c) 1.89 d) 1.64 e) 0.97
f) 0.86 g) 3.06 h) 4.12 i) 1.11 j) 2.22
14. a) 211 b) 3.6 c) 1.46 d) 96 e) 3.21
f) 1.21 g) 0.032 h) 0.013 i) 0.021 j) 42
15. a) 4.7 b) 9.1 c) 13.4 d) 210.5 e) 0.7 f) 0.1
g) 19.0 h) 1.9 i) 0.8 j) 15.0 k) 5.1 l) 0.1
m) 1.4 n) 5.6 o) 0.2 p) 3.1 q) 7.0 r) 15.0
16. a) 17.8 b) 23.1 c) 24.4 d) 25.6 e) 24.5 f) 24.2 g) 22.8 h) 15.5
i) 17.2 j) 16.9 k) 16.1 l) 18.5 m) 18.2 n) 24.9 o) 16.4
17. a) 0.3 b) 0.5 c) 0.2 d) 2.0 e) 1.6 f) 3.1 g) 1.9
h) 2.6 i) 0.4 j) 1.8 k) 3.7 l) 2.9 m) 2.8 n) 0.3 o) 3.3
18. a) \$0.15 b) \$0.10 c) \$0.20 d) \$1.89
19. a) 1 line b) 1 line c) 8 lines d) 1 line e) 6 lines f) 2 lines g) 1 line

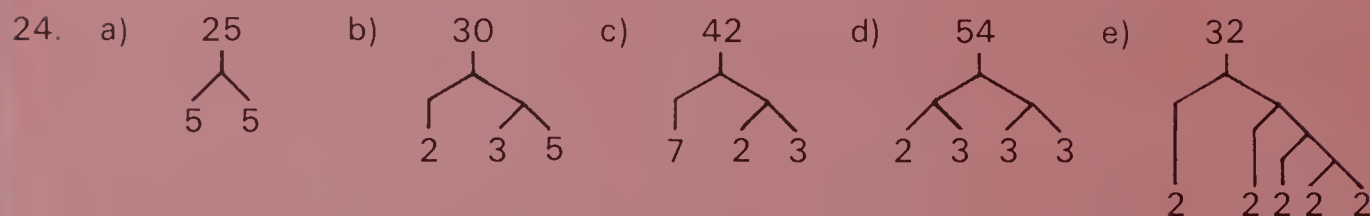
20.	Shape	Rotational symmetry	No Rotational symmetry	Order of Rotational symmetry
	a)	✓		4
	b)	✓		2
	c)		✓	
	d)	✓		2
	e)		✓	
	f)	✓		8
	g)		✓	

21.

	Number	Indicated product	Factors	Number of factors
a)	3	1×3	1, 3	2
b)	8	1×8	1, 8, 2, 4	4
		2×4		
c)	14	1×14	1, 14, 2, 7	4
		2×7		
d)	17	1×17	1, 17	2
e)	22	1×22	1, 22, 2, 11	4
		2×11		
f)	38	1×38	1, 38, 2, 19	4
		2×19		
g)	27	1×27	1, 27, 3, 9	4
		3×9		
h)	36	1×36	1, 36, 2, 18,	9
		2×18	3, 12, 4, 9, 6	
		3×12		
		4×9		
		6×6		

22. a) 1, 12, 2, 6, 3, 4
 b) 1, 30, 2, 15, 3, 10, 5, 6
 c) 1, 32, 2, 16, 4, 8
 d) 1, 45, 3, 15, 5, 9
 e) 1, 70, 2, 35, 5, 14, 7, 10
 f) 1, 88, 2, 44, 4, 22, 8, 11

23. a) $c = 21$
 b) $c = 20$
 c) $c = 60$
 d) $c = 140$
 e) $c = 132$



25. a) $2 \times 2 \times 2 \times 5$ b) 7×5 c) $2 \times 2 \times 7$ d) $2 \times 2 \times 19$ e) 5×17
 f) $2 \times 7 \times 2 \times 2 \times 2$ g) $2 \times 2 \times 2 \times 2 \times 3 \times 5$

26. a) 2 b) 2 c) 5 d) 2 e) 7 f) 6 g) 6 h) 15 i) 18 j) 21 k) 9 l) 14

27. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

28. 29, 31

29. a) $\frac{3}{5}$ b) $\frac{6}{10}$ c) $\frac{7}{5}$ d) $\frac{9}{4}$ e) $\frac{11}{2}$

30. a) $\frac{50}{100}$ b) $\frac{40}{100}$ c) $\frac{15}{10}$ d) $\frac{50}{100}$ e) $\frac{6}{4}$ f) $\frac{5}{2}$ g) $\frac{3}{2}$ h) $\frac{11}{10}$

31. a) $\frac{3}{10}$ b) $\frac{5}{1}$ c) $\frac{3}{4}$ d) $\frac{7}{4}$ e) $\frac{33}{10}$ f) $\frac{3}{5}$ g) $\frac{6}{5}$

32. a) 06:00, 12:00, 18:00, 24:00 b) 02:15, 02:30, 02:45, 03:00 c) 14:17, 14:23, 14:29, 14:35

33. a) 15 cm b) 40 cm c) 60 cm by 60 cm

34. a) 24 cm^2 b) 20.25 cm^2 c) 16.9 cm^2 d) 10 cm^2 e) 36 cm^2

35. 4 36. 7 37. 74 38. 97 39. 11:30 40. 1 h 35 min

41. \$1.35 42. \$6.75 43. 6 44. 28 45. 80 46. 12

47. 7 48. 8 49. 10 50. 100 km 51. 12 52. 15 km

Further Practice/Unit 3 Ratio and Rate

1. Complete.

	Comparison	Fraction form	Ratio form
a)	3 triangles to 2 squares		
b)	6 cars to 8 bicycles		
c)	1 teacher to 32 students		
d)	1 principal to 438 students		

2. Write equivalent least-terms fractions.

- a) 6:4 b) 8:10 c) 12:4 d) 5:15 e) 3:8 f) 12:24
- g) 80:40 h) 9:27 i) 30:45 j) 20:36 k) 75:100 l) 35:49

3. Write 3 equivalent ratios for each.

- a) 1:4 b) 3:2 c) 1:1 d) 8:3 e) 2:5 f) 1:10 g) 5:1

4. Complete.

	Rate	Ratio	Fraction	Least-terms fraction	Equivalent least-terms ratio
a)	4 goals in 8 shots				
b)	6 boys to 3 canoes				
c)	50 km in 2 h				
d)	9 wins in 12 games				

5. Complete.

	Rate	Ratio	Equivalent ratio	Meaning
a)	5 bananas cost \$0.60	$\frac{5}{60}$	$\frac{5 \times 3}{60 \times 3} = ?$	15 bananas cost ?
b)	10 min to walk 1 km		$\frac{? \times 5}{? \times 5} = ?$	
c)	1 set of paints to 3 students		$\frac{? \times 10}{? \times 10} = ?$	
d)	10 doughnuts cost \$1.50		$\frac{? \div 10}{? \div 10} = ?$	

6. A student runs 2 km in 12 min.

- a) How long will it take to run 6 km if she runs at the same rate?
- b) How long will it take to run 10 km if she runs at the same rate?
- c) How long will it take to run 0.5 km if she runs at the same rate?

Per Cent

7. Express as a per cent.

- a) $\frac{34}{100}$ b) $\frac{82}{100}$ c) $\frac{50}{100}$ d) $\frac{64}{100}$ e) $\frac{20}{100}$ f) $\frac{99}{100}$ g) $\frac{5}{100}$ h) $\frac{3}{100}$
i) $\frac{19}{100}$ j) $\frac{9}{100}$ k) $\frac{4}{100}$ l) $\frac{22}{100}$ m) $\frac{1.4}{100}$ n) $\frac{8.5}{100}$ o) $\frac{25.5}{100}$ p) $\frac{43.2}{100}$
q) $\frac{90.5}{100}$ r) $\frac{88.8}{100}$ s) $\frac{0.2}{100}$ t) $\frac{0.9}{100}$ u) $\frac{0.4}{100}$ v) $\frac{0.7}{100}$ w) $\frac{0.5}{100}$ x) $\frac{0.1}{100}$

8. Express each ratio as a per cent.

- a) 30:100 b) 25:100 c) 42:100 d) 88:100 e) 56:100 f) 92:100
g) 3:100 h) 8:100 i) 15:100 j) 1:100 k) 28:100 l) 5:100
m) 14.5:100 n) 36.21:100 o) 87.4:100 p) 21:100 q) 66.6:100 r) 50:100
s) 1.4:100 t) 0.5:100 u) 0.8:100 v) 2.34:100 w) 0.1:100 x) 0.15:100

9. Express as a fraction.

- a) 30% b) 50% c) 90% d) 24% e) 19% f) 85%
g) 6% h) 3% i) 7% j) 1% k) 4% l) 9%
m) 1.3% n) 50.5% o) 19.3% p) 84.25% q) 27.7% r) 61.9%
s) 0.5% t) 0.2% u) 0.7% v) 0.9% w) 0.1% x) 0.6%

10. Express each fraction as a per cent.

- a) $\frac{6}{20}$ b) $\frac{9}{10}$ c) $\frac{1}{2}$ d) $\frac{20}{25}$ e) $\frac{4.5}{10}$ f) $\frac{4}{5}$ g) $\frac{4}{2}$ h) $\frac{5}{4}$ i) $\frac{3}{20}$ j) $\frac{1.5}{10}$

11. Express each ratio as a per cent.

- a) 2:4 b) 9:10 c) 6:5 d) 15:25 e) 8:20 f) 19:50
g) 30:10 h) 4:4 i) 20:25 j) 10:50 k) 8:5 l) 22:20

12. Express each decimal as a per cent.

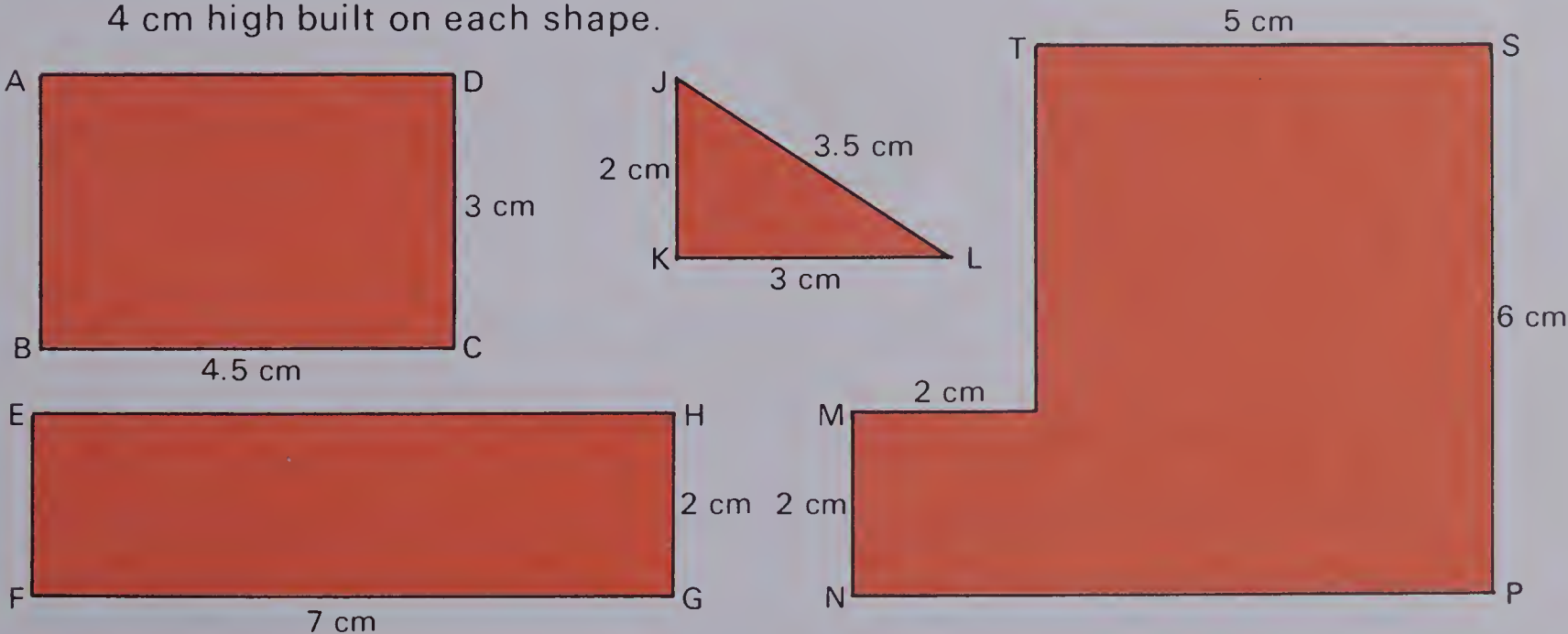
- a) 1.5 b) 3.7 c) 0.45 d) 0.8 e) 0.55 f) 0.5
g) 7.4 h) 8.25 i) 2.36 j) 0.05 k) 0.99 l) 6.66

13. Express as a per cent.

- a) 24:100 b) $\frac{29}{100}$ c) $\frac{4}{20}$ d) 3:4 e) 1.4 f) 5:100
g) $\frac{8}{100}$ h) $\frac{6}{5}$ i) 40:10 j) 2.1 k) 13.7:100 l) $\frac{6.4}{100}$
m) $\frac{7}{20}$ n) 25:25 o) 0.4 p) 2.7:100 q) $\frac{0.6}{100}$ r) $\frac{5.4}{10}$

Discount, Area, Perimeter, and Volume

14. Find.
- | | | | |
|---------------|---------------|---------------|---------------|
| a) 10% of 20 | b) 4% of 80 | c) 5% of 80 | d) 30% of 90 |
| e) 40% of 100 | f) 60% of 120 | g) 9% of 180 | h) 15% of 45 |
| i) 20% of 200 | j) 18% of 130 | k) 35% of 140 | l) 75% of 300 |
15. Calculate the sale price.
- | | | |
|--|--|--|
| a) shoes \$20.00
Discount 10%
Sale price ? | b) bicycle \$120.00
Discount 12%
Sale price ? | c) watch \$45.00
Discount 5%
Sale price ? |
| d) book \$4.50
Discount 8%
Sale price ? | e) calculator \$28.00
Discount 8%
Sale price ? | f) radio \$36.00
Discount 20%
Sale price ? |
16. Calculate the volume of each.
- | | | |
|--|---|--|
| a) rectangular prism
length is 5 cm
width is 6 cm
height is 10 cm | b) cylinder
approximate area
of base is 14 cm ²
height is 12 cm | c) triangular prism
area of base is 40 cm ²
height is 25 cm |
|--|---|--|
17. a) Find the perimeter of each shape.
b) Find the area of each shape.
c) Find the volume of a structure
4 cm high built on each shape.



Average, Decimals, and Triangles

18. Find the average of

- a) 11, 9, 15, 13 b) 25, 15, 18, 22 c) 38, 37, 29, 30, 31, 39
 d) 1.3, 1.1, 1.8, 0.8, 1.6 e) 7.4, 6.2, 7.8, 6.8, 5.8
 f) 20.9, 20.4, 20.1, 20.7, 19.9

19. Add.

- | | | | | | |
|-------------|--------------|-------------|-------------|-------------|---------------|
| a) 24.6 | b) 246.3 | c) 0.46 | d) 0.08 | e) 1.43 | f) 136.42 |
| 3.2 | 19.8 | 0.38 | 0.40 | 2.77 | 254.33 |
| 0.8 | 77.4 | 0.92 | 0.59 | 0.98 | 820.04 |
| <u>14.0</u> | <u>364.0</u> | <u>0.11</u> | <u>0.87</u> | <u>0.65</u> | <u>501.68</u> |

20. Subtract.

- | | | | | | |
|------------|-------------|-------------|--------------|---------------|--------------|
| a) 13.5 | b) 144.8 | c) 0.46 | d) 46.38 | e) 904.06 | f) 84.00 |
| <u>6.4</u> | <u>96.3</u> | <u>0.39</u> | <u>19.67</u> | <u>765.07</u> | <u>67.99</u> |

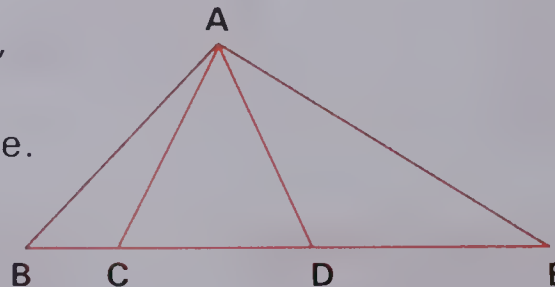
21. Multiply.

- | | | | | | |
|------------|------------|-------------|-------------|------------|------------|
| a) 6.4 | b) 1.06 | c) 94.6 | d) 206.4 | e) 134.6 | f) 43.72 |
| <u>3.8</u> | <u>3.2</u> | <u>0.28</u> | <u>0.58</u> | <u>8.9</u> | <u>9.6</u> |

22. Complete.

- | | | | |
|--------------------------|-------------------------|---------------------------|--------------------------|
| a) $46 \times 10 = ?$ | b) $3.4 \times 1 = ?$ | c) $50 \times 0.1 = ?$ | d) $0.43 \times 100 = ?$ |
| e) $7.4 \times 0.1 = ?$ | f) $18 \times 0.01 = ?$ | g) $24 \div 10 = ?$ | h) $6.3 \div 1 = ?$ |
| i) $36 \div 0.1 = ?$ | j) $8.2 \times 100 = ?$ | k) $9.5 \div 0.1 = ?$ | l) $48 \div 0.01 = ?$ |
| m) $0.9 \times 1000 = ?$ | n) $14 \div 0.01 = ?$ | o) $3.5 \times 1 = ?$ | p) $8 \times 0.1 = ?$ |
| q) $8 \times 0.01 = ?$ | r) $6 \div 100 = ?$ | s) $660 \div 1000 = ?$ | t) $25 \times 10 = ?$ |
| u) $4.1 \times 0.01 = ?$ | v) $40 \div 10 = ?$ | w) $0.36 \times 1000 = ?$ | x) $463 \div 1000 = ?$ |

23. Name a) the isosceles triangle,
 b) the scalene triangle,
 c) the equilateral triangle.



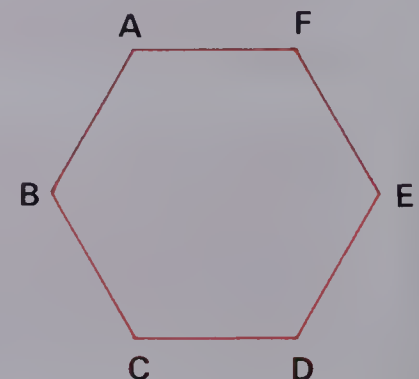
24. Trace hexagon ABCDEF.

- a) Join A to C and F to D.

Which type of triangle have you created?

- b) Join A to D, B to E, and C to F.

Which type of triangle have you created?



Ordered Pairs and Division

25. Write the number pairs that name the following intersections on a grid. Begin each trip at (0, 0).
- a) Go east 4 blocks then north 2 blocks.

b) Go east 5 blocks then north 7 blocks.

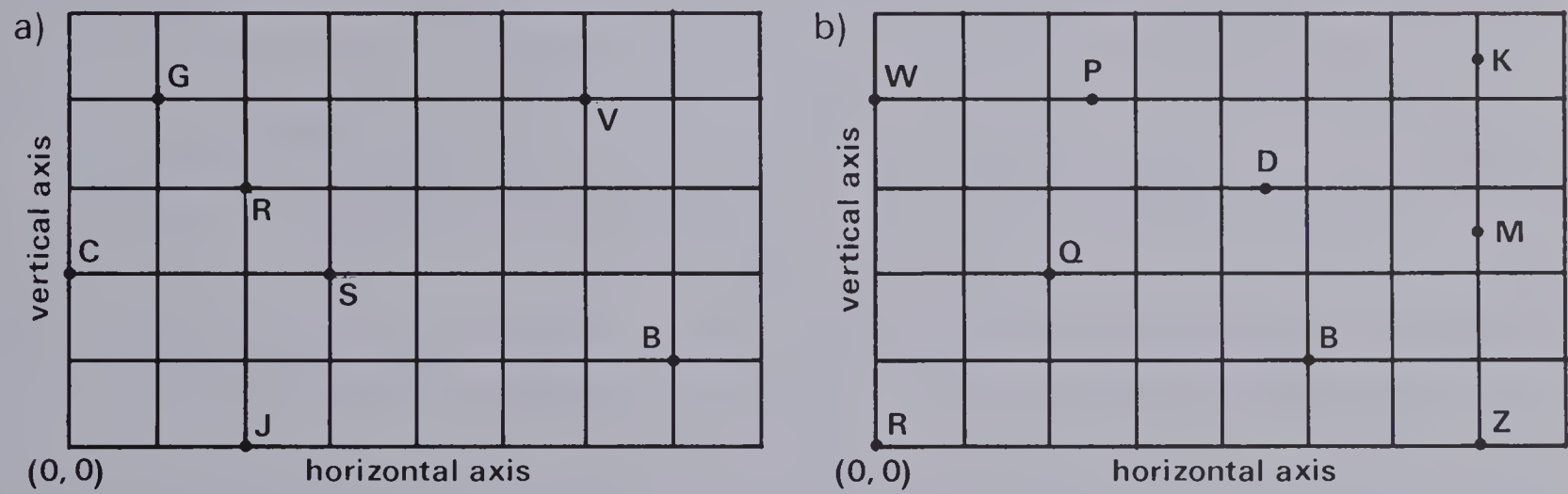
c) Go east 1 block then north 5 blocks.

d) Go east 6 blocks then north 1 block.

e) Go east 2 blocks.

f) Go north 4 blocks.

26. Write the ordered pairs that name the points.



27. Divide. Express the quotient to the nearest tenth.
- a) 240 by 17

b) 136 by 12

c) 538 by 35

d) 631 by 46

e) 327 by 24

f) 143 by 9

g) 324 by 28

h) 460 by 38

i) 199 by 25

j) 258 by 19

k) 1562 by 12

l) 2641 by 18

m) 3147 by 24

n) 1969 by 16

o) 3864 by 42

p) 46.6 by 25

q) 32.7 by 22

r) 29.9 by 13

s) 45.5 by 15

t) 65.8 by 42

u) 1.36 by 8

v) 2.89 by 11

w) 6.32 by 18

x) 5.34 by 21

y) 7.61 by 45

28. Divide. Continue the division until the remainder is 0.

a) $\frac{2}{5}$

b) $\frac{3}{4}$

c) $\frac{4}{8}$

d) $\frac{1}{4}$

e) $\frac{3}{8}$

f) $\frac{5}{25}$

g) $\frac{5}{2}$

h) $\frac{7}{4}$

i) $\frac{4}{5}$

j) $\frac{9}{8}$

k) $\frac{30}{25}$

l) $\frac{45}{10}$

29. A car travelled 2800 km in 5 d.
What is the average distance
travelled in 1 d?

30. A car travelled 3153.5 km in 7 d.
What is the average distance
travelled in 1 d?

Word Problems

31. Find the number that is:
between 40 and 60,
an even number,
and a multiple of 10.
32. Find the number that is:
between 1 and 40,
an odd number,
a prime number,
greater than 5×6 ,
and less than 5×7 .
33. Find the number that is:
an even number,
greater than 20,
less than 30,
and the sum of its 2 digits is 6.
34. Find the number that is:
between 50 and 100,
an odd number,
the sum of its digits is 9,
a multiple of 3,
and the product of its digits is 8.
35. Find the number that is:
an odd number,
less than 12,
and is a prime number greater than 7.
36. Find the number that is:
between 40 and 50,
an odd number,
divisible by 3,
and the sum of its digits is 9.
37. René bought a skirt, a sweater
and a blouse. To find the
total amount:
She must know ?
She finds the answer by ?
38. Joan had a certain amount of money
to spend for 3 gifts.
She wants to know how much money
she has left after her 3 purchases.
She must know ?
She finds the answer by ?
39. The Miller family wants to know
the cost per kilometre for the
gasoline they used on a trip.
They must know ?
They find the answer by ?
40. A class takes a trip on the train.
The students want to know the
length of time they will be
travelling on the train.
They must know ?
They find the answer by ?

Answers to Further Practice/Unit 3

1.

	Comparison	Fraction form	Ratio form
a)	3 triangles to 2 squares	$\frac{3}{2}$	3:2
b)	6 cars to 8 bicycles	$\frac{6}{8}$	6:8
c)	1 teacher to 32 students	$\frac{1}{32}$	1:32
d)	1 principal to 438 students	$\frac{1}{438}$	1:438

2.
- a) 3:2

b) 4:5

c) 3:1

d) 1:3

e) 3:8

f) 1:2

g) 2:1

h) 1:3

i) 2:3

j) 5:9

k) 3:4

l) 5:7

3. Answers will vary.

4.

	Rate	Ratio	Fraction	Least-terms fraction	Equivalent least-terms ratio
a)	4 goals in 8 shots	4:8	$\frac{4}{8}$	$\frac{1}{2}$	1:2
b)	6 boys to 3 canoes	6:3	$\frac{6}{3}$	$\frac{2}{1}$	2:1
c)	50 km in 2 h	50:2	$\frac{50}{2}$	$\frac{25}{1}$	25:1
d)	9 wins in 12 games	9:12	$\frac{9}{12}$	$\frac{3}{4}$	3:4

5.

	Rate	Ratio	Equivalent ratio	Meaning
a)	5 bananas cost \$0.60.	$\frac{5}{60}$	$\frac{5 \times 3}{60 \times 3} = \frac{15}{180}$	15 bananas cost \$1.80
b)	10 min to walk 1 km	$\frac{10}{1}$	$\frac{10 \times 5}{1 \times 5} = \frac{50}{5}$	50 min to walk 5 km
c)	1 set of paints to 3 students	$\frac{1}{3}$	$\frac{1 \times 10}{3 \times 10} = \frac{10}{30}$	10 sets of paints to 30 students
d)	10 doughnuts cost \$1.50	$\frac{10}{150}$	$\frac{10 \div 10}{150 \div 10} = \frac{1}{15}$	1 doughnut costs \$0.15

6.
- a) 36 min

b) 60 min

c) 3 min
7.

a) 34%

i) 19%

q) 90.5%

b) 82%

j) 9%

r) 88.8%

c) 50%

k) 4%

s) 0.2%

d) 64%

l) 22%

t) 0.9%

e) 20%

m) 1.4%

u) 0.4%

f) 99%

n) 8.5%

v) 0.7%

g) 5%

o) 25.5%

w) 0.5%

h) 3%

p) 43.2%

x) 0.1%

8.
- a) 30%

i) 15%

q) 66.6%
- b) 25%

j) 1%

r) 50%
- c) 42%

k) 28%

s) 1.4%
- d) 88%

l) 5%

t) 0.5%
- e) 56%

m) 14.5%

u) 0.8%
- f) 92%

n) 36.21%

v) 2.34%
- g) 3%

o) 87.4%

w) 0.1%
- h) 8%

p) 21%

x) 0.15%

9.
- a) $\frac{30}{100}$

i) $\frac{7}{100}$

q) $\frac{27.7}{100}$
- b) $\frac{50}{100}$

j) $\frac{1}{100}$

r) $\frac{61.9}{100}$
- c) $\frac{90}{100}$

k) $\frac{4}{100}$

s) $\frac{0.5}{100}$
- d) $\frac{24}{100}$

l) $\frac{9}{100}$

t) $\frac{0.2}{100}$
- e) $\frac{19}{100}$

m) $\frac{1.3}{100}$

u) $\frac{0.7}{100}$
- f) $\frac{85}{100}$

n) $\frac{50.5}{100}$

v) $\frac{0.9}{100}$
- g) $\frac{6}{100}$

o) $\frac{19.3}{100}$

w) $\frac{0.1}{100}$
- h) $\frac{3}{100}$

p) $\frac{84.25}{100}$

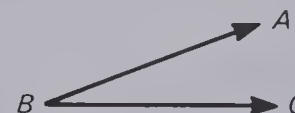
x) $\frac{0.6}{100}$

10. a) 30% b) 90% c) 50% d) 80% e) 45%
f) 80% g) 200% h) 125% i) 15% j) 15%
11. a) 50% b) 90% c) 120% d) 60% e) 40% f) 38%
g) 300% h) 100% i) 80% j) 20% k) 160% l) 110%
12. a) 150% b) 370% c) 45% d) 80% e) 55% f) 50%
g) 740% h) 825% i) 236% j) 5% k) 99% l) 666%
13. a) 24% b) 29% c) 20% d) 75% e) 140% f) 5% g) 8% h) 120%
i) 400% j) 210% k) 13.7% l) 6.4% m) 35% n) 100% o) 40% p) 2.7%
q) 0.6% r) 54%
14. a) 2 b) 3.2 c) 4 d) 27 e) 40 f) 72 g) 16.2 h) 6.75 i) 40 j) 23.4 k) 49 l) 225
15. a) \$18.00 b) \$105.60 c) \$42.75 d) \$4.14 e) \$23.80 f) \$28.80
16. a) 300 cm³ b) 168 cm³ c) 1000 cm³
17. a) ABCD is 15 cm, EFGH is 18 cm, JKL is 8.5 cm, MNPST is 26 cm
b) ABCD is 13.5 cm², EFGH is 14 cm², JKL is 3 cm², MNPST is 34 cm²
c) ABCD is 54 cm³, EFGH is 56 cm³, JKL is 12 cm³, MNPST is 136 cm³
18. a) 12 b) 20 c) 34 d) 1.3 e) 6.8 f) 20.4
19. a) 42.6 b) 707.5 c) 1.87 d) 1.94 e) 5.83 f) 1712.47
20. a) 7.1 b) 48.5 c) 0.07 d) 26.71 e) 138.99 f) 16.01
21. a) 24.32 b) 3.392 c) 26.488 d) 119.712 e) 1197.94 f) 419.712
22. a) 460 b) 3.4 c) 5 d) 43 e) 0.74 f) 0.18 g) 2.4 h) 6.3
i) 360 j) 820 k) 95 l) 4800 m) 900 n) 1400 o) 3.5 p) 0.8
q) 0.08 r) 0.06 s) 0.66 t) 250 u) 0.041 v) 4 w) 360 x) 0.463
23. a) $\triangle ADE$ b) $\triangle ABE$ c) $\triangle ACD$ 24. a) isosceles b) equilateral
25. a) (4, 2) b) (5, 7) c) (1, 5) d) (6, 1) e) (2, 0) f) (0, 4)
26. a) C (0, 2), G (1, 4), J (2, 0), R (2, 3), S (3, 2), V (6, 4), B (7, 1)
b) R (0, 0), W (0, 4), Q (2, 2), P (2.5, 4), D (4.5, 3), B (5, 1), Z (7, 0), M (7, 2.5), K (7, 4.5)
27. a) 14.1 b) 11.3 c) 15.4 d) 13.7 e) 13.6 f) 15.9 g) 11.6 h) 12.1 i) 8.0
j) 13.6 k) 130.2 l) 146.7 m) 131.1 n) 123.1 o) 92.0 p) 1.9 q) 1.5 r) 2.3
s) 3.0 t) 1.6 u) 0.2 v) 0.3 w) 0.4 x) 0.2 y) 0.2
28. a) 0.4 b) 0.75 c) 0.5 d) 0.25 e) 0.375 f) 0.2
g) 2.5 h) 1.75 i) 0.8 j) 1.125 k) 1.2 l) 4.5
29. 560 km 30. 450.5 km 31. 50 32. 31 33. 24 34. 81 35. 11 36. 45
37. the cost of each item; by addition
38. the amount she spent and the amount she started with; by subtraction
39. the total number of kilometres travelled and the amount of gasoline used; by division
40. the departure and arrival times; by subtraction

Mathematics Dictionary

Acute Angle

An angle with measurement less than 90° .
 $\angle ABC$



Acute Triangle

A triangle with all 3 angles acute.

Addends

Numbers which are to be added.
 2, 6, 11

$$2 + 6 + 11$$

Addition

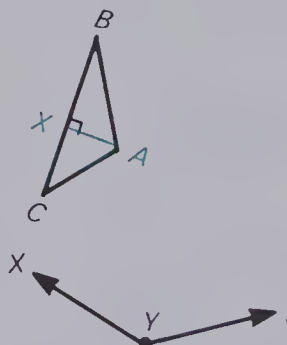
An operation which combines 2 addends.

Algorithm

A method for carrying out an operation.

Altitude (of a Figure)

The line segment from a vertex perpendicular to the side opposite (or its length).
 (AX for $\triangle ABC$)



Angle

2 rays with a common end point.
 $\angle XYZ$

Anti-Clockwise

See *Counter-Clockwise*.

Approximately Equal

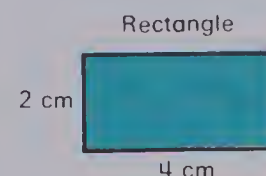
1.9×9 is about 2×10 or 20.

Area

An amount of surface. A number of square units which compares the size of a region to the size of a unit square region.

Area Expressions

$$\begin{aligned} \text{Area} &= (2 \times 4) \text{ cm}^2 \\ &= 8 \text{ cm}^2 \end{aligned}$$



Array

A set of objects in rows and columns.

Associative (Grouping) Property

When 3 addends or factors are to be added or multiplied, any 2 may be added or multiplied first.

$$(3 + 2) + 5 = 3 + (2 + 5)$$

$$(3 \times 2) \times 5 = 3 \times (2 \times 5)$$

Average (Arithmetic Mean)

The quotient of a sum of numbers divided by the number of addends.

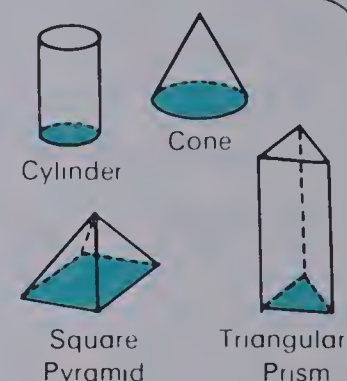
$$M = \frac{2 + 2 + 5 + 12 + 31}{5} = \frac{52}{5} = 10.4$$

Bar Graph

A graph in which the data is displayed by bars. A number of units of the data is represented by a unit bar.

**Base
(of a Solid)**

Any face of the solid. The coloured faces are usually considered bases, but any face may be taken as a base.



Base (of a Triangle)

Any side of a triangle.

Bisect

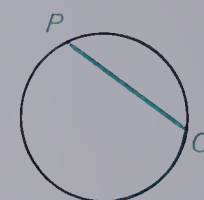
To separate a geometric figure into 2 congruent parts.

Capacity

Another name for volume which is used in connection with volumes of liquids (e.g. the capacity of a container is 1 l).

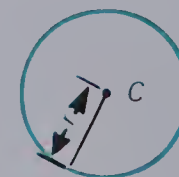
**Chord
(of a Circle)**

A line segment with both end points on a circle.
PQ



Circle

The set of points in a plane at a fixed distance (radius, *r*) from a given point (centre, *C*).



Circumference

The perimeter (length) of a circle.

Clockwise

The direction of rotation of the hands of a clock.

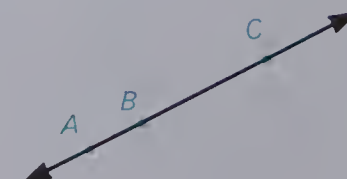
**Closed Figure
(Curve)**

 and  are closed figures.

 and  are not closed figures.

**Collinear
(Points)**

3 or more points on the same straight line.
A, B, C



Common Factor

$$6 = 3 \times 2$$

$$15 = 5 \times 3$$

3 is a common factor of 6 and 15.

See *Greatest Common Factor*

Common Multiple

$$12 = 6 \times 2$$

$$12 = 4 \times 3$$

12 is a common multiple of 6 and 4
(also of 2 and 3).

See *Least Common Multiple*.

**Commutative
(Order) Property**

2 numbers may be added or multiplied in either order.

$$2 + 3 = 3 + 2$$

$$2 \times 3 = 3 \times 2$$

Compass

An instrument used to indicate the direction of the North magnetic pole.

Compasses (Pair of)

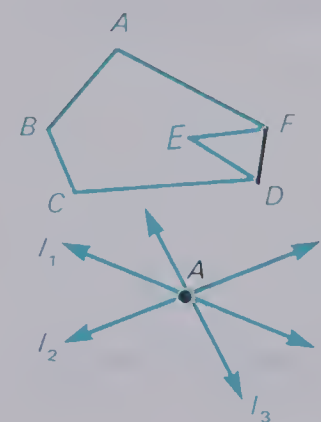
An instrument used in the drawing of a circle.

Composite Number

A whole number which has more than 2 factors.

Concave Polygon

$ABCDEF$ is a concave polygon. At least 1 diagonal (FD) lies outside the polygon.



Concurrent Lines

3 or more lines (l_1, l_2, l_3) with a common point (A).

Congruent Figures

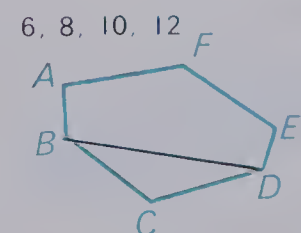
Geometric figures of the same size and shape.

Consecutive

Next in order, as in **consecutive even whole numbers**.

Convex Polygon

$ABCDEF$ is a convex polygon. Every diagonal (BD , for example) lies within the polygon.



**Correspondence
(One-to-One)**

Each of the members in 2 sets is matched with exactly 1 member in the other set.

$$\begin{array}{c} \{a, b, c, d, e\} \\ \downarrow \downarrow \downarrow \downarrow \downarrow \\ \{1, 2, 3, 4, 5\} \end{array}$$

Counter-Clockwise

The direction of rotation opposite to the hands of a clock.

Counting

Matching objects in a set with a subset of the natural numbers 1, 2, 3, 4, ...

Counting Numbers

Often called *natural numbers*

$N = \{1, 2, 3, 4, \dots\}$ is the set of natural numbers.

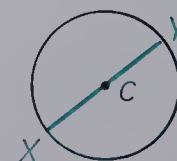
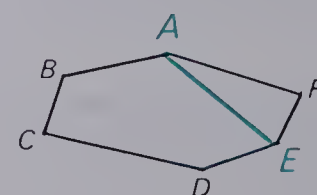
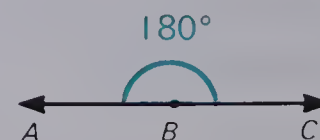
Cube

A regular solid with 6 faces. Each face is a square.

Data

Numerical information.

Decagon	A polygon with 10 sides.
Decimal	A numeral in decimal notation.
Decimal Numeration System	A place-value system based on powers of 10 (base 10) which represents numbers by using the 10 symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 as digits.
Decimal Place	The power of 10 associated with each position in a decimal numeral. 172.03 1 is in the hundreds place 7 is in the tens place 2 is in the units (ones) place 0 is in the tenths place 3 is in the hundredths place
Decimal Point	The dot in a decimal numeral between the units and tenths places.
Degree	A unit of angle measurement. The measurement of straight angle $\angle ABC$ is 180° .
Denominator	10 is the denominator of the fraction $\frac{3}{10}$.
Diagonal (of a Polygon)	A line segment whose end points are 2 vertices which are not consecutive. AE is a diagonal of polygon $ABCDEF$.
Diameter	XCY is a diameter of the circle. The line segment passes through the centre of the circle.
Difference	The result of subtracting one number from another.
Digits	The individual symbols used in a numeration system. The digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 for our base 10 system.
Dimensions	For a plane (2-dimensional) figure—length and width. For a solid (3-dimensional) figure—length, width, and height.



Distance (Between 2 Points in a Plane)

The length of the line segment joining the 2 points.



Distributive Property (of Multiplication Over Addition)

$$3 \times (2 + 5) = 3 \times 2 + 3 \times 5$$

Dividend

$$\begin{array}{r} 3 \leftarrow \text{Quotient} \\ \text{Divisor} \rightarrow 6 \overline{) 23} \leftarrow \text{Dividend} \\ \underline{18} \\ 5 \leftarrow \text{Remainder} \end{array} \quad 23 = 6 \times 3 + 5$$

Divisible

$$\begin{array}{r} 5 \\ 6 \overline{) 30} \end{array} \quad \begin{array}{l} 30 = 6 \times 5 \\ 30 \text{ is divisible by } 6 \end{array}$$

Division

The undoing operation with respect to multiplication.

Multiplication
(doing)
 $3 \times 2 = 6$

Division
(undoing)
 $6 \div 2 = 3$

Divisor

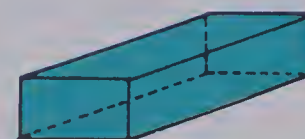
See *Dividend*.

Dodecagon

A polygon with 12 sides.

Edge (of a Solid)

The black line segments are **edges** of the solid.



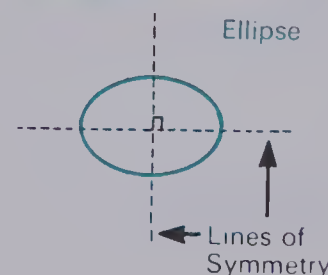
Element (of a Set)

A member of a set.

Ellipse

A closed plane figure like a circle stretched both ways along a diameter.

An ellipse has only 2 lines of symmetry.



Elliptical

In the shape of an ellipse.

Empty Set

The set with no elements, $\{ \}$.

Equality

The relation between 2 symbols representing the same idea.

$$8 = 6 + 2$$

Equation

A statement expressing equality.

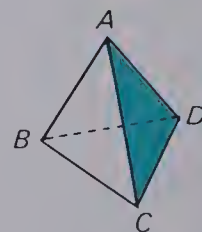
$$3 + 5 = 8$$

$$q + 2 = 6$$

Equilateral Triangle

A triangle with all sides of equal length.

Equivalent Fractions	Fractions which represent the same number. $\frac{1}{2}, \frac{2}{4}, \frac{5}{10}, \frac{50}{100}, \dots$
Estimate	A calculation usually made by rounding off numbers to a multiple of a power of 10. 9×31 is about 10×30 or 300
Even Number	An even number has 2 as a factor. $\{0, 2, 4, 6, \dots\}$ is the set of even whole numbers.
Expanded Notation	$3124 = 3(1000) + 1(100) + 2(10) + 4$
Exponent	A number to indicate the number of times another number (the base) is multiplied by itself. 5^3 exponent base $5^3 = 5 \times 5 \times 5$
Face of a 3-D Figure	Triangular region ADC is one face of $ABCD$.
Factor (of a Number)	$36 = 36 \times 1$ 36, 1 are factors of 36 $36 = 18 \times 2$ 18, 2 are factors of 36 $36 = 12 \times 3$ 12, 3 are factors of 36 $36 = 9 \times 4$ 9, 4 are factors of 36 $36 = 6 \times 3 \times 2$ 6, 3, 2 are factors of 36
Flip	A motion in which a figure is moved from one position to another. In the new position, the figure is a mirror reflection of the figure in the first position.
Flip Line	A figure is said to be flipped over a line from one position to another position.
Fraction	A symbol of the form $\frac{a}{b}$ where a and b are whole numbers and b is not equal to 0.
Geometric Figure	A set of points in a plane or in 3-D space.
Geometry	A study of shapes.
Graph	An illustration of information.



Greater Than
Greatest Common Factor

7 is greater than 3 (that is, $7 > 3$).

$$36 = 2 \times 2 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

The greatest common factor (GCF) of 24 and 36 is $2 \times 2 \times 3$ or 12

Height (of a Figure)
Hexagon

Altitude of the figure. See *Altitude*.

A polygon with 6 sides.

Inequality

A mathematical sentence involving $>$ (is greater than) or $<$ (is less than).

Interior (of a Plane Figure)

A polygon

The interior of the polygon

Intersection

A common point in a common set of points.
For example, 2 non-parallel lines in a plane intersect at a point.

Inverse Operations

Addition and subtraction are inverse (**doing** and **undoing**) operations. Multiplication and division are inverse operations.

Isosceles Kite

A kite with 2 pairs of adjacent equal sides.

Isosceles Trapezium

The non-parallel sides are equal in length.

Isosceles Triangle

2 sides are equal in length.

Kite

A quadrilateral with 1 diagonal bisected by the other.

Least Common Multiple

$$8 = 2 \times 2 \times 2$$

$$12 = 2 \times 2 \times 3$$

The least common multiple (LCM) of 8 and 12 is $2 \times 2 \times 2 \times 3$ or 24

Length

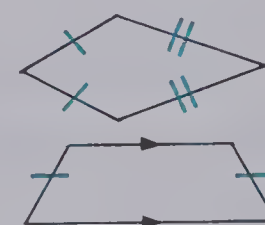
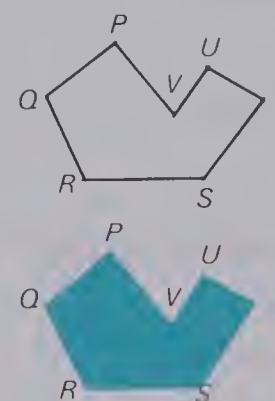
Describes a line segment.

Less Than

3 is less than 7 ($3 < 7$).

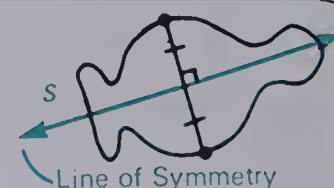
Letter Symbol

A letter used to represent a number. It is customary to use lower case letters.



Line of Symmetry

If the figure is folded along the line s , the 2 parts of the figure coincide. The figure is symmetrical with respect to the line.



Line Segment

Line Segment AB



Mass

An amount of material. The amount is usually expressed in grams, kilograms, tonnes, etc.

Matching

Setting up a one-to-one correspondence from the elements of one set to the elements of a second set. See *Correspondence (One-to-One)*.

Mathematics

The logical study of number, patterns, shape, and many related concepts.

Metre

The basic unit of length in the metric system of measurement.

Metric System

A decimal system of weights and measures, introduced in France in the 18th century, which is now used throughout most of the world.

Mid-Point (of a Line Segment)

The point (P) which bisects a line segment (AB).



Mixed Numeral

The mixed numeral $3\frac{1}{2}$ means $3 + \frac{1}{2}$

Multiple

$$3 \times 5 = 15$$

$$3 \times 12 = 36$$

15 and 36 are both multiples of 3.

Multiplication

An operation which combines 2 factors.

n -gon

A polygon with n sides.

Nonagon

A polygon with 9 sides.

Number Line

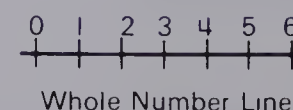
An illustration of a set of numbers.

Number Pair

A pair of numbers shown in the form (a, b) .

In an operation, the first number is used first and the second number is used second.

For example, $(5, 2)$ for subtraction: the result is $5 - 2$ or 3.



Numeral

A symbol which represents a number.

Numerator

2 is the numerator of the fraction $\frac{2}{5}$.

Obtuse Angle

$\angle ABC$ has measurement between 90° and 180°

Obtuse Triangle

$\triangle ABC$ has 1 interior obtuse angle ($\angle ABC$).

Octagon

Odd Number

A polygon with 8 sides.

An odd number does not have 2 as a factor.

$\{1, 3, 5, 7, \dots\}$ is the set of odd whole numbers.

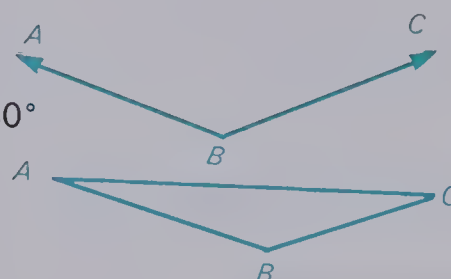
One-to-One

Correspondence

See *Correspondence (One-to-One)*.

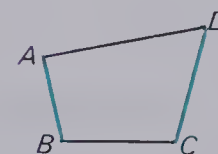
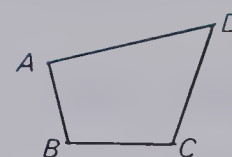
**Opposite Angles
(of a Quadrilateral)**

In quadrilateral $ABCD$,
 $\angle A$ and $\angle C$ are opposite angles,
 $\angle B$ and $\angle D$ are opposite angles.



**Opposite Sides
(of a Quadrilateral)**

Sides AB and CD have no vertex in common.
They are opposite.



Orbit

The path followed by a space body or a
man-made space vehicle.

The planet Earth has an **elliptical orbit**
around the Sun.

Ordered Pair

A pair of numbers in a specific order.
The ordered pair $(1, 2)$ has the opposite
order to $(2, 1)$.

Parallel Lines

Lines in the same plane with no points in common.

Parallelogram

A quadrilateral with both pairs of opposite
sides parallel.



Pattern

A repeated sequence of numbers or objects.

Pentagon

A polygon with 5 sides.

Per Cent

A 2-term ratio with the second term 100.

$\frac{37}{100}$ or 37%

Perfect Square

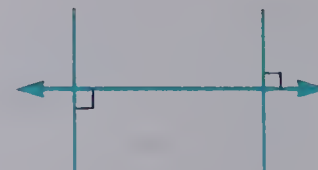
The square of a whole number. See *Square (of a Number)*.

Perimeter

The length of the boundary of a region.

Perpendicular Lines

Lines or line segments which determine a right angle.

**Pictograph**

A graph in which a number of units is represented by a picture. The picture is related to the information displayed.

Place Value

In 235, 2 means 2×100 .

In 325, 2 means 2×10 .

Plane Figure

A 2-dimensional figure in a plane.

Polygon

Closed plane figure; each side is a straight line segment.

**Prime Number**

A whole number which has exactly 2 factors.

Product

The result of multiplication.

Protractor

An instrument used to measure an angle.

Pyramid

A 3-dimensional figure.



Triangular
Pyramid

Square
Pyramid

Quadrilateral

A polygon with 4 sides.

Quotient

4 is called the quotient of $12 \div 3$.

See *Dividend*.

Radius

See *Circle*.

Ratio

A set of numbers usually used to indicate a comparison: e.g. 2:3:5

2-term ratio is used in 2 forms:

e.g. 2:3 or in fraction form $\frac{2}{3}$

Rectangle

A parallelogram with angles which are right angles.

Rectangular Region

The interior of a rectangle.

Rectangular Solid

A rectangular prism.

Regular Polygon

A polygon with all sides equal and all angles equal.

Remainder

See *Dividend*.

Rhombus

A quadrilateral with all sides of equal length.

Right Angle

An angle ($\angle ABC$) with measurement 90° .

**Right Bisector
(of a Line Segment)**

The line XYZ such that $AY = YB$
and $\angle AYZ = 90^\circ$.

Scale, Horizontal

A number of units of a set of data is shown as a unit in a horizontal line.

Scale, Vertical

A number of units of a set of data is shown as a unit in a vertical line.

Scalene Triangle

A triangle with no 2 sides equal.

Set

A collection of things.

Shape

A figure and its interior.

Slide

A motion in which a figure is moved a given distance in a given direction.

Slide Arrow

An arrow $\rightarrow$ which indicates the distance and direction of a slide.

Smooth Curve

A smooth curve is drawn through a set of points to show a relation.

Solid

A 3-dimensional figure (*not* including its interior points).

Sphere

The set of all points in space at a fixed distance (*radius*, r units) from a given point (*centre*, C).

Square

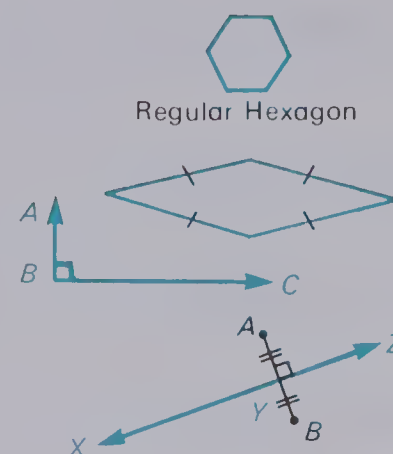
A rhombus with interior angles right angles.

**Square
(of a Number)**

The product of 2 equal factors.
See *Perfect Square*.

Standard Numeral

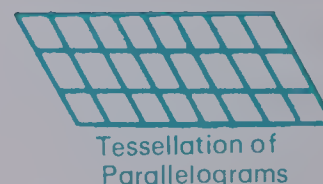
A numeral formed by a number of digits in a row, e.g. 5783. Each digit to the left of a digit represents 10 times that digit.



$$3 \times 3 = 3^2$$

(read 3 squared)

Straight-Line Graph	A graph in which the data is displayed by line segments. A number of units of the data is represented by a unit line segment.
Subtraction	The inverse (undoing) operation with respect to addition.
Subtrahend	A number which is subtracted from another number called the minuend.
Successive Sum	See <i>Consecutive</i> . The result of adding.
Symmetry (with Respect to a Line)	See <i>Line of Symmetry</i> .
Tally	A count of a set of data is usually organized in a tally form.
Tessellation	An arrangement of geometric shapes that would cover a plane.
Tetrahedron	A triangular pyramid.
Tiling	See <i>Tessellation</i>
Trapezium (Trapezoid)	A quadrilateral with 1 pair of opposite sides parallel. See <i>Isosceles Trapezium</i> .
Triangle	A polygon with 3 sides.
Turn	A motion in which a figure is moved from one position to another by turning.
Turn Centre	A point about which a figure is turned from one position to another.
Vertex (of a Polygon)	The point of intersection of adjacent sides of a polygon.
Volume	An amount of space.
Whole Numbers	$N_0 = \{0, 1, 2, 3, 4, \dots\}$ is the set of whole numbers.



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